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A selection of
outstanding
undergraduate
research
projects
of the final year
students on the
Bachelor of
Business
(Honours)



Ollscoil
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Editorial

Welcome to the fourth edition of Exemplar, a collection of some of the best undergraduate projects of the final year students on the Bachelor of Business (Honours).

After the formal grading of the final year projects was completed, supervising staff were invited to nominate students for possible inclusion. Nominations were reviewed by the editorial team and a shortlisted selection of students were contacted to confirm if they would like to be included. Supervising staff then oversaw a revision and enhancement of the graded submission, and the final work is published in Exemplar.

Students were required to identify a business topic that interested them and that they would like to learn more about whilst meeting the research expectations of the programme. This non-prescriptive approach allowed students to flex their intellectual muscle in a unique project of their own design. The project topics were diverse this year and included: impact of farming practices on the levels of greenhouse gas emissions, comparative study of dairy operations, entrepreneurship, generation Z's purchasing intentions, Circular Economy model and Irish construction industry, engagement marketing, and management of remote work.

Each student reviewed the available literature and looked at their issue through the lens of that literature to develop a deeper and more critical understanding of their topic. Students were not required to complete any primary research but to make best use of the secondary resources available to them to examine their issue. A review of the references used illustrates the students' ability to source relevant published materials to enable them to complete their task. Congratulations to the students and their supervisors for completing the projects. My thanks to Dr Miriam McSweeney, Kevin McDonagh, Anne Tynan, Myles McHugh, Gillian Carey, Deirdre Lusby and Orla Flynn for their support in compiling this edition.

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Editor

Lessons that the Irish construction industry can learn from China and the Netherlands when adopting the Circular Economy model

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Abstract

The purpose of this research is to examine the emerging phenomenon of the Circular Economy (CE) and to explore whether adopting this model could have a positive impact on the Irish construction industry. In the context of the built environment, a CE refers to a regenerative method of approaching construction systems and processes, that optimises the use of resources and reduces environmental impact. Two countries that have already implemented CE practices and policies within the construction industry are compared, namely China and the Netherlands. The outcomes achieved by these two countries are analysed and considered further in the context of the Irish construction industry. The motivation for this research is to highlight the need for an alternative to the linear economic model which is unsustainable and currently causing high levels of resource consumption globally. The CE model appears to offer significant opportunity to achieve much more sustainable and efficient use of resources. Fully understanding and appreciating the CE model, along with effective frameworks will help the Irish construction industry transition successfully to the CE model.

Keywords: Circular Economy, Construction and Demolition waste, Circular flow, the Netherlands, China, Ireland

Abbreviation Glossary: Circular Economy (CE), Cradle-to-cradle (C2C), Ellen MacArthur Foundation (EMF), Construction & Demolition Waste (C&D Waste).

Introduction

Today, we are using about 1.6 earths; meaning we are using about 60% more of the earth's resources than it can regenerate every year (Long, 2021). The construction industry is responsible for over 30% of the extraction of natural resources, as well as 25% of solid waste generated in the world (Benachio, Gabriel Luiz Fritz, et al, 2020). This is the case as the construction industry adopts mostly a linear economic model of “take, make, dispose”, using materials for the construction of buildings and disposing them at the end of life. When using the linear economic model buildings are assembled for one time use and don't retain potential for reuse (Benachio, Fritz, et al, 2020). The impact of the linear take-make-dispose model on the environment has prompted societal actors to refocus their efforts on the adoption of a more sustainable model and initiating the paradigm shift towards a Circular Economy (CE).

The definition for the CE that will be used in this research paper is the Ellen MacArthur Foundation's (EMF's) definition, this definition was chosen as it encompasses much of what the CE truly endeavours to achieve, that being, to look beyond the current take-make-dispose extractive industrial model, and aims to redefine growth, focusing on positive society-wide benefits. Gradually decoupling economic activity from the consumption of finite resources and designing waste out of the system. EMF believe that the CE is based on three principles: designing out waste and pollution; keeping products and materials in use; and regenerating natural systems (Ellen MacArthur Foundation, 2021). EMF have been at the forefront of activism for the CE, trying to promote the changes required to transform every element of our current take-make-dispose model. They currently have large corporate partners with whom they explore strategies and solutions that support their CE transition.

In the context of the built environment, a CE refers to a regenerative method of approaching construction systems and processes, that optimises the use

of resources and reduces environmental impact. These include techniques for extending the life of systems, boosting value over their entire lifecycle, and decreasing overall waste production (Guerra et al.,

2021). Circular construction aims to close building material loops by reusing, sharing, leasing, repairing, refurbishing, upcycling, or recycling rather than continuing the traditional take-make-dispose process. It is about considering how to maximise the lifespan and reusability of entire buildings or materials at the very start of the design process (ReLondon - London Waste and Recycling Board, 2020). Circular construction begins with a design that considers all aspects of a structure's lifecycle and continues in the next cycle. The design process includes the lifecycles of construction parts, products, and materials. In the CE model, end-of-life building materials should have their various components disassembled and processed for reuse, the deconstructed pieces should operate as a material bank for future buildings, keeping the components and materials in a closed loop (Hopkinson et al., 2019).

Each stakeholder in a construction project should ensure high levels of communication. For example, the architect must understand how the demolition contractor operates, and the recycler must understand what technical constraints the circular constructor places on the materials that he uses, so that the recycling technology can be adapted to suit and so on so forth down the chain (Holland Circular Hotspot, 2018).

The purpose of this research is to delve deeper into the literature and to investigate the emerging phenomenon of the CE, comparing China and the Netherlands with Ireland, and to further explore the feasibility for the Irish construction industry to adopt the CE model. The motive behind conducting this research was to analyse an alternative to the current take-make-dispose model, the CE was selected as it has been growing in “popularity” as an alternative solution for the last number of years. The literature review was completed by searching for key words such as “circular construction”, “China and the circular economy”, “the

Netherlands and circular construction” and “Ireland and circular construction”. The relevant literature was then selected by analysing various abstracts and introductions to determine whether the journal articles were relevant to the research. The databases that were used in

doing so were Science Direct, Research Gate and Google Scholar. A lot of the research was also collected from Government documents and pieces written by various organisations who dedicate their time to doing research surrounding the CE.

The rationale behind comparing the circular construction industries of both the Netherlands and China with Ireland were both quite different. The Netherlands was chosen as territorially it is quite similar to Ireland, they are both geographically speaking, small European countries. According to PBL (2019), the Netherlands resembles a densely populated city with excellent infrastructure, major ports and logistics. It presents the right conditions for a circular economy, meaning that sharing certain products (e.g., cars) is easier and utilising industrial waste flows less complicated, whereas China in comparison from the research conducted appears to be implementing policies and procedures from predominantly a place of need, as their level of resource consumption is so high, they have little choice but to move away from the linear economy and find a less resource intensive model to adopt. The Netherlands has publicly stated their ambitious plans of becoming 100% circular by 2050 which would be of great influence to Ireland if they continue on track. Throughout this paper hopefully it can be identified as to whether Ireland can adopt any of the procedures being carried out by either China or the Netherlands to accelerate the transition towards the CE within the construction industry.

This paper will begin by discussing the history of the CE, and the authors who first defined the CE as it is today. It will then introduce China and what they are doing to reduce their resource consumption, and how they have been moving towards a CE within the construction industry. The same will then be discussed for the Netherlands. Thirdly, Ireland will be analysed to

establish whether it is currently implementing any circularity within the construction industry. Lastly, it is hoped that suggestions can be made as to whether Ireland could introduce any of the policies and procedures that China and/or the Netherlands currently have in place.

History of the Circular Economy (CE)

Although difficult to pinpoint exactly, the first evidence of “circularity” or “circular flow” being discussed as a possible concept to be adapted was by Boulding (1966), who allegorises 19th century cowboys who would settle, consume all the resources in that area and move on, versus spacemen in spaceships who do not have the option to be wasteful and must recycle or repurpose everything they use. In his work, Boulding (1966) is emphasising that the world's resources are scarce and that both production and consumption alone are bad things and lead to masses of waste. The world today is running on the unsustainable linear economic model. A linear economy traditionally follows the “take-make-dispose” step-by-step plan (Otekenari, 2020). This means that raw materials are collected, transformed into products that are used until they are finally discarded as waste. Value is created in this economic system by producing and selling as many products as possible (Het Groene Brein, 2019). This existing economic model is unsustainable in that it does not account for all stages of a product's life cycle. It is an approach that has a grave impact on the environment and generates a great deal of waste.

According to Het Groene Brein (2017) the linear economy jeopardises the supply of materials. This uncertainty is caused by fluctuating raw material prices, scarce materials, geopolitical dependence on different materials and increasing demand, problems which are less likely to occur in a fully developed CE. Michelini, Moraes et al (2017) tell us that from an ecological standpoint the production of goods is at the expense of the productivity of our ecosystems. Excessive pressure on these ecosystems jeopardises the provision of essential ecosystem services, such as water, air and soil cleaning.

Stahel (1986) outlines that the industrial revolution accelerated the adaptation of the linear economy and enabled society to overcome the scarcity of food, shelter and products. Machinery creating the means to mass produce products and materials, in turn meaning more waste. Stahel (2018) quotes “Mass production turned scarcities first into plenty, then abundance and a plethora of waste”. (Pre-industrial revolution resources were more scarce and people relied on a CE of sorts but based on scarcity, as expressed by settlers in an old new english maxim “use it up wear it out, make it do, or do without” (Stahel 2018, p.12).



Figure 1 - Principle of a linear economy - Source: *Circular Economy in Fashion and Textile From Waste, 2020*

Following on from Boulding (1966), the Swiss Architect Walter Stahel (1986) believed that the linear economic model was unsustainable under the continually growing volumes of waste and the limitations of natural resources available. He established the need to incorporate “spiral loops”. According to Stahel (1982), this loop system would “minimize matter, energy-flow and environmental deterioration without restricting economic growth or social and technical progress”. The four stages of this loop include the Reuse phase which encourages first the reuse of a product/material (loop 1), the Repair phase, if a material/product cannot be reused, can it be repaired? (loop 2), the Reconditioning phase (loop 3) this is where you would utilise used products or components as a source for new ones, and last of all the Recycling phase (loop 4) means the use of

a product many times in its primary state rather than one-off use (Maity et al, 2020).

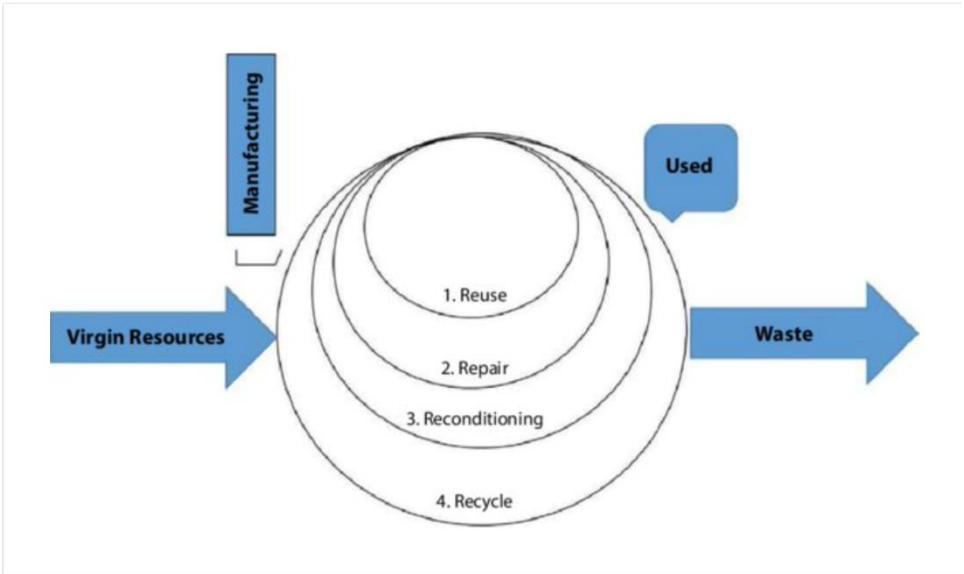


Figure 2 - Stahel's spiral loop for the circular economy – Source: *Circular Economy in Fashion and Textile From Waste*, 2020

Later, Pearce and Turner (1990) explain the need for a shift from the traditional linear or open-ended economic system to the CE system. It was at this point that CE was fully defined in economic terms for the first time. Drawing on the principle that “everything is an input to everything else”, the authors examined the current linear economic system and proposed a new economic model, the CE (Pearce and Turner 1990, p.35-41).

‘Cradle-to-Cradle’ (C2C) was a term first coined by Walter Stahel but later popularised by William McDonough, an American Architect and Michael Braungart, a German Chemist (Kumar and Mohajan, 2021). Together

McDonough and Braungart (2002) described the concept of C2C design. The concept is inspired by nature, and the purpose of the design is to get more value out of the resources that are used for manufacturing products and providing services, encouraging the value and quality of those resources to be in use as long as possible, if not infinitely (IFCO Systems, 2021). McDonough (2002) put forward a design framework derived from nature that had three main principles: 1. Everything is a resource for something else. 2. Use clean and renewable energy, and 3. Celebrate diversity. The main aim was to move away from ‘Cradle-to-Grave’ which is linked with the linear model of “take, make, dispose” towards a more circular way of thinking. Below is a diagram created by EMF replicating the C2C concept into a model they call “The Butterfly Diagram” (ellenmacarthurfoundation, nd). The diagram is a powerful tool which helps to highlight the application of the CE model in practice, the proposed changes and the several solutions that facilitate the transition.

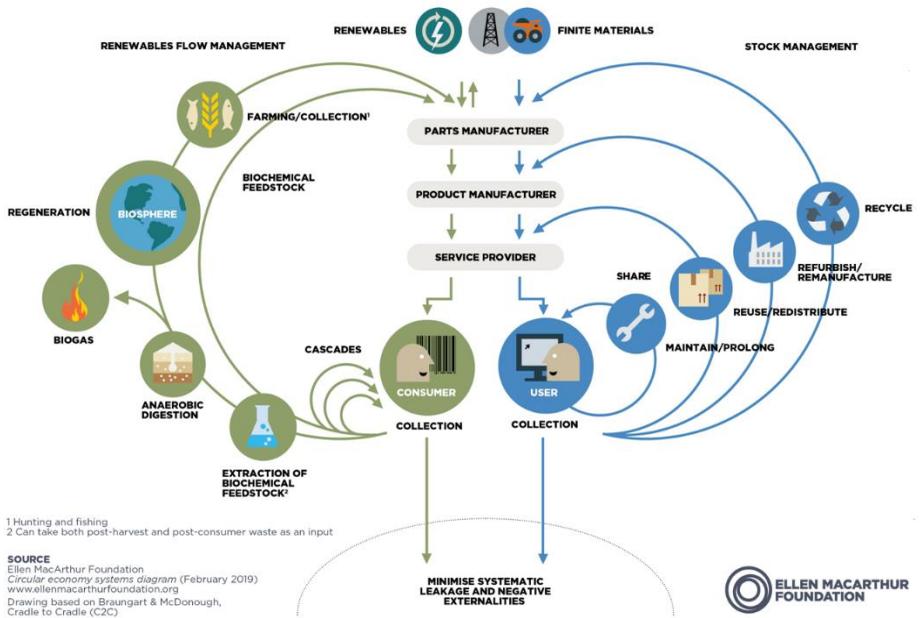


Figure 3 - Drawing based on the C2C Concept Source: “The Butterfly Diagram: Visualising the Circular Economy” (2019) - Ellen MacArthur Foundation

Today’s main driver of the CE is EMF, the foundation was launched in 2009 with the main aim of helping to achieve the transition to a CE. EMF creates resources, publications and tools that help set effective policies. “The goal is to build circular economy capacity, address common barriers to progress, understand the necessary enabling conditions, and pilot circular economy practices” (ellenmacarthurfoundation, n.d.).

In December 2015, the European Commission proposed the first Circular Economy Action Plan (CEAP). It included measures to help stimulate Europe’s transition towards a CE, boost global competitiveness, foster

sustainable economic growth and generate new jobs. This was later reviewed and an updated CEAP was released in 2020. It is one of the main building blocks of the European Green Deal, Europe's new agenda for sustainable growth which aims to create the first carbon-neutral continent in the world—as well as crucial global agreements. The main objectives of CEAP are to make sustainable products the norm, ensure less waste, make circularity workable for people, cities, and regions. They plan to do this is by tackling the industries that use the most resources and where the potential for circularity is highest, in industries like: the motor industry, the electronic industry, the textiles industry, and the construction industry (European Commission, 2020).

China and The Circular Economy

Mathews and Tan (2016) tell us that China's consumption of the world's resources is reaching crisis levels. To produce 46% of global aluminium, 50% of steel and 60% of the world's cement in 2011, it consumed more raw materials than the 34 countries of the OECD combined: 25.2 billion tonnes. Meaning China is now the world's largest consumer of energy, the largest producer and consumer of coal, and the largest emitter of carbon dioxide (ChinaPower, 2016). In 2014, China generated 3.2 billion tonnes of industrial solid waste, only 2 billion tonnes of which were recoverable in order to be recycled, incinerated or reused. Mathews and Tan (2016) also tell us that by contrast the European Union generated 2.5 billion tonnes of waste in 2012, of which 1 billion was recycled or used for energy. It is clear that China is one of the largest global producers of waste, consumers of energy and emitters of carbon dioxide. Hence, why adopting a more circular model could have huge potential to reduce the consumption of such resources which would have both major environmental and economic benefits.

According to Mathews and Tan (2016), China's interest in the CE was piqued in the 1990's by Germany and Japan's recycling laws. China's State Council produced a policy statement in 2005 highlighting the economic and environmental risks of the nation's heavy resource exploitation and recognising the CE as the primary means of dealing with them. Studies carried out by Bao and Lu (2020) tell us about the Construction & Demolition (C&D) waste recycling plants in Shenzhen and what is being done to prevent such waste being simply sent to landfill. Governmental interventions were brought into place in Shenzhen in 2015 by implementing a series of strategies which intended to stimulate the C&D waste industries. This began by first shutting down all landfill sites in the city bar one which only accepted renovation waste. This aimed to inform developers that landfilling was no longer acceptable and also informed them that a building permit could not be obtained without first proving that there was sufficient waste disposal capacity. The government released its first C&D waste discharge quota with effect from January 2020 outlining the amount of waste which is allowed to be transported out of a site, amounts allowed differed on whether it was a new construction, a renovation or a demolition. For example, no more than 10% of demolition waste can be transported out of a site. As a result, engaging in the C&D waste recycling industry has become a necessity.

Guangdong province brought in regulations to prohibit the quarrying of river stone and sand which consequently caused the prices of virgin aggregates to significantly increase, this however had a positive impact on the sale of recycled aggregates which were now far more affordable, being cheaper by about 20% to 30%. In addition to this, C&D waste recycling centres in Shenzhen decided to bring in rules surrounding the quality and composition of C&D wastes, they created a staged charging scheme which meant that if the composition of the C&D wastes were already of high-quality arriving to the recycling centres they would receive more money

than if they had gone through zero processing thus encouraging stakeholders to conduct their own on-site sorting.

Mathews and Tan (2016) also found that Western countries have struggled for decades to get companies to collaborate along supply chains, and that this is where China has an advantage as more than half of its manufacturing activities are conducted in industrial parks and export processing zones. Targeting these parks is beginning to slash the intensity of China's resource use. They use the example of manufacturers in an industrial park who print circuit boards which require copper elements. The copper that the manufacturers now use has been recovered from waste somewhere else in the park rather than purchasing copper from mining farms, therefore closing industrial loops to turn outputs from one manufacturer into inputs for another. This approach reduces the consumption of virgin materials and the generation of waste.

The Netherlands and The Circular Economy

The Netherlands has cemented their position as a trailblazer in CE initiatives; having already set an ambitious goal of becoming 100% circular by 2050 and having also pledged to reduce primary material consumption by 50% in 2030 (Ministry of Infrastructure and Water Management, 2019). According to The Circular Gap report (2020), the Dutch economy is 24.5% circular (PACE, 2020). This means that a quarter of all the materials needed to fulfil societal needs such as for housing, mobility and nutrition must come from non-virgin, secondary sources. This report also found that global circularity stands at 8.6%, just under a third of the Netherlands' Circularity Metric. This indicates that The Netherlands is in a much better position than most other nations in their transition to a CE (PACE, 2020).

In the Netherlands, Zhang et al (2018) tell us that the recycling rate for C&D waste reached 95% since 2001. Furthermore, since 2010 a recycling rate of almost 100% was achieved. The rate of recycling was partially accelerated due to issues with contaminated soil in landfill sites. The Dutch government responded to this by enforcing landfill bans and recycling targets. In the 1980's the recycling of C&D waste was predominately just the crushing of waste into aggregate which would then be used for "backfilling" sites. As time has moved on, technology and machinery have progressed, and they are now capable of sorting and recovering a wide variety of materials ranging from wood, to plastics and metals. The quality of aggregates has therefore improved dramatically facilitating their use for an even wider range of purposes. Certification schemes are also now in place to ensure the soil quality from sites is upheld to a high standard (European Commission, 2016).

Along with being progressive with the recycling of C&D waste, the Netherlands has also shown innovation with designing and building for a circular future. In 2007 a construction group called Delta development was approached by C2C founder William McDonough to complete the first CE development project in the Netherlands. This was to be a 114,000 square metre mixed-use development in Schiphol. Park 20|20 was to be the first full service C2C inspired development in the Netherlands. The project was due to include closed cycles of water, waste and energy (William McDonough et al, 2022). According to Damen (2012), the most innovative element in the project was the inclusion of end-of-use options for buildings right from the start and the application of so-called 'resource passports'. Resource passports allow for materials to be tracked and accounted for so that these materials can be utilised again at a later period in time if the project has to be deconstructed and rebuilt to serve a different purpose. Material suppliers in this project are encouraged to retain ownership of their materials and come up with innovative ways for these materials to be disassembled for reuse in their next life. All fixtures and fittings are C2C

certified to ensure that they are designed in a way to allow them to be disassembled easily and retain as much value as possible. In this project to ensure the development remained as circular as possible it was important that materials from every stage of the supply chain were sourced with circularity in mind (McDonough et al, 2022).

Ireland and The Circular Economy

In Ireland, according to the latest published EPA figures (2019), the quantity of C&D waste generated and collected increased to 8.8 million tonnes in 2019. This represents a significant increase of 2.6 million tonnes on the quantity of C&D waste generated in 2018 (EPA, 2021). Most of the C&D waste collected in Ireland in 2019 was backfilled (82 per cent), while 10 per cent went for disposal and only 7 per cent was recycled (EPA, 2021).

The CE has only begun to gain momentum in Ireland in very recent years with little legislation in place to promote circularity. According to Keenan (2022), Ireland is currently only 1.6% circular which is significantly lower than the Netherlands at 24.5%. The Irish government's Waste Action Plan 2020 outlined the challenges surrounding waste and waste management in a number of different sectors. Within the construction industry, they outlined the need to promote waste prevention by managing waste more efficiently on sites, by further expanding the range and use of recycled materials, and to create a demand and a market for recycled aggregates. Also included in the plan was a suggested system to improve waste data gathering by standardising waste dockets and the use of a barcoded electronic docket tracking system for the movement of waste (Department of the Environment, Climate and Communications, 2020).

Following on from the Waste Action Plan, the General Scheme of the Circular Economy Bill 2021 was published (Department of the Environment, Climate and Communications, 2021). The overall aim of the General Scheme is to provide a statutory framework for the implementation of a CE in Ireland, moving away from the current linear economic model. It outlines the importance of better segregation of C&D waste, emphasising the need to significantly improve the recycling rates for C&D waste into individual material streams, either at source or at waste processing facilities (Department of the Environment, Climate and Communications, 2021). The General Scheme is proposing that ‘non-scheduled minerals’, in particular sand, gravel and stone to be crushed for aggregate should be licensed under the Circular Economy Bill (Department of the Environment, Climate and Communications, 2021). It is also being suggested that a levy should be paid for the extraction of mineral resources. At current the absence of such a levy has resulted in quarrying for the aggregate materials being cheaper by the tonne than using materials recovered from the demolition of buildings or produced during construction activities. By adding a levy to the purchase of aggregates from quarry’s, it would encourage the purchase of recycled materials thus reducing the amount that gets sent to landfill and in turn would result in millions of tonnes of resources being beneficially reused annually (Department of the Environment, Climate and Communications, 2021).

Transitioning Ireland to a CE will have far-reaching implications for industry and will result in significant changes in waste management techniques, allowing for increased recycling and reuse of materials. Ireland’s transition to a CE will be guided by the future Circular Economy Strategy, which will serve as a national policy framework. This bill establishes a statutory foundation for the strategy and the commitment to a CE. The Circular Economy Bill 2021 will lay the groundwork for some actions outlined in the Waste Action Plan 2020 as well as propose

measures to aid the CE. It is a critical step in Ireland's successful transition to a CE, and it demonstrates the government's commitment to achieving that aim (Department of the Environment, Climate and Communications, 2021).

What can Ireland learn from China and the Netherlands? Next steps?

The purpose of this research was to investigate the literature surrounding the emerging CE model within the Dutch and Chinese construction industries, in particular, aiming to discover whether there are activities being carried out, projects taking place or policies being implemented which could be adopted by the Irish construction industry. From this literature review, it is apparent that the construction industry within these countries has introduced measures and policies to reduce resource consumption and encourage the reuse and recycling of materials, in particular, the recycling of C&D waste. Government policy in the Chinese city of Shenzhen was first implemented in 2015 making the decision to shut down all landfill sites. Although this was just one city of many in China, it is certainly a start and projects a positive message to others.

In Guangdong, the quarrying of stone and sand being banned will have a positive impact on both the sale of recycled aggregates and the reduced number of active quarries in the area. Similarly, Ireland wants to introduce a levy on quarried materials. It is hopeful that in the future they will make plans to like Shenzhen ban quarrying for aggregates entirely.

The Netherlands being the first to construct a fully certified C2C development in 2007 could be a good direction for Ireland to head in, as significantly more emphasis needs to be put on going back to the design phase and designing out waste entirely. Although it is important that countries find ways to reduce, reuse and recycle their waste it would be better if there was less of it in the first place. Designing and creating materials that are built to be disassembled and reused would definitely help

both environmentally and economically in the Irish construction industry. Like Shenzhen and sites in the Netherlands, Ireland should make plans to sort their C&D waste efficiently into different flows to ensure that the optimum amount of use comes from the materials.

From this literature review, it is also apparent that there is a lack of a mutual understanding of what the CE really stands for. It would therefore be important for all stakeholders to have a mutual knowledge and understanding of the CE model to ensure that it can be implemented effectively within the construction industry in Ireland. This could be done by carrying out regular training sessions or collaborating with organisations such as EMF or Circuléire to make sure they have an up to date understanding of what it means to be circular.

It should also be noted that according to the Circularity Gap report that although circularity is firmly in the national and governments agendas that there is a worsening circularity gap, the global economy has gone from 9.1% circular in 2019 to 8.6% in 2020 (PACE, 2020). Effective frameworks will need to be put in place in all industries to ensure that a transition from the linear economic model to a circular economic model can take place.

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An investigation into the effects that engagement marketing has on buyer behaviour

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Abstract

This literature review examines traditional marketing definitions and challenges their relevance in the contemporary business environment. The differences between traditional marketing practices and Engagement Marketing activity are highlighted. This paper explores the relationship between Engagement Marketing and Buyer Behaviour. Engagement Marketing activity also challenges the traditional model of how consumers behave with several steps in the buying process being bypassed. Measurement of the effectiveness of marketing activity continues to challenge the marketing professional and there is an absence of recognised metrics in this area. This paper suggests that additional research into this topic is warranted.

Keywords: Buyer Behaviour, Engagement Marketing, metrics, marketing practices.

Introduction

This research was undertaken to examine the effectiveness of engagement marketing on buyer behaviour and to help understand how consumers are influenced to purchase or engage with a business that utilises these practices. This literature review will use published literature to understand the basis of engagement marketing, the factors that affect engagement marketing and the most susceptible types of buyers. Literature has been abundant on the two separate conceptualisations, but there is limited research on the interconnected relationship between Engagement marketing and Buyer behaviour. Therefore, I will be investigating the linkages between the two concepts and give an insight into the relativeness of one aspect to the other. This relatively new concept has limited research from a European perspective; therefore, it examines the topics from a wider generalisable area.

Purpose/Rationale

This project is essential and valuable to anyone in marketing practice or examining buyer perceptions. This project will provide a framework for professionals in the industry to distinguish between traditional and engagement marketing. For this research, case studies will allow the reader to actively engage and provide a deeper understanding of the concept while biases are being reduced.

Objectives

The questions that will be addressed in this project are;

What are the differences between engagement marketing and the traditional forms?

What types of buyers can be affected by engagement marketing?

In what stages are buyers affected mainly by engagement marketing practices?

This literature review will discuss engagement marketing in detail, followed by an in-depth report on the individual buyer behaviours as opposed to commercial buyer behaviour and an investigation into the interception of engagement marketing and buyer behaviour. Finally, it will examine what metrics are best used to evaluate the effectiveness of engagement marketing on buyer behaviour and will offer an opinion backed by research that evaluates whether engagement marketing is worth the investment or should a business focus on traditional streams.

Literature review

Engagement marketing

Engagement marketing has many meanings; it is defined by Harmeling et al. (2016) as ‘a firm’s deliberate effort to motivate, empower, and measure customer contributions to marketing functions.’ At present, there is no definite conceptualisation of engagement marketing, but for the purpose of this research, I will be using the above definition (Bilbro & Loureiro 2020). Engagement marketing includes incentive programmes, referral bonuses, and omnichannel retail and communication (Thomas 2021). The first record of engagement marketing is not precise in the literature; some theories believe it has been a concept from time immemorial, while others believe it was a more recent discovery. For clarification, some of the earliest forms of marketing recognised were signatures on pottery between 600-700BC and coins with pictures of emperors, battles, and events were the first recognised attempt at mass media marketing (Marketing Museum 2022). The first accustomed record in 89AD was in Pompeii after Mount

Vesuvius erupted; advertising was found on walls after the reminisce of ash was removed (Marketing Museum 2022).

Fast moving consumer goods and events are industries that have used engagement marketing in the past. FMCG are goods that turn over quickly on a shelf with low margins and are continually replenished (Upadhyaya & Shukla 2021). Examples of businesses that utilise engagement marketing practices include Dove, Nike (in partnership with tour de France) and Bud Light (Harmeling et al 2016). According to Harmeling et al (2016), these businesses have been rewarded with greater brand awareness, long term effect on brand affinity, increased sales, and benefit of the user-generated content.

Engagement marketing versus traditional marketing practices

To fully understand the concept of engagement marketing, it is imperative to understand the differences between engagement marketing and traditional marketing practices and the best practices of engagement marketing. It is known that customers have been recognised in research to desire and demand more from marketing activities, and to fill this void, engagement marketing has been proposed (Kumar et al. 2016) (Harmeling et al. 2016). Customers have become active participants in marketing practices; in order to capitalise on these shifts in behaviour, firms must engage with their customers effectively (Harmeling et al. 2016). Internal marketers have relinquished their marketing strategy to the customer due to this paradigm shift (Kir 2016). Businesses are bewildered by the concept that consumers are now the most influential impact of a company's long-term sustained competitive advantage since the discovery of engagement marketing (Kir 2016) (Van Doorn et al. 2010). Harmeling et al. (2016) argue that those businesses should change their perspectives and look at the consumers 'beyond economic transactions'.

Kotler has defined traditional marketing activities as ‘the science and art of exploring, creating and delivering value to satisfy the needs of a target market at a profit.... Marketing is often performed by a department within an organization’ (Cohen, 2011). In contrast the definition of engagement marketing includes a well-planned controlled experience used to retain, sustain and nurture its customer base using customer contributions and including non-transactional customer behaviour (Harmeling et al. 2016) (Urdea 2021) (Van Doorn 2020) (Beckers et al 2017). Bernd Schmitt (1999) states that businesses need to move away from ‘features and benefits’ and move towards offering an experience to customers. The above clearly shows that Kotler’s definition of marketing is outdated and overlooked the phenomenon of engagement marketing while Bernd Schmitt has a broader contemporary view of the ideology.

The differences between engagement marketing and traditional marketing practices are transparent; engagement marketing strives for active participation, such as word of mouth and reviews, Engagement marketing requires the consumer to be an active participant in the promotional activity. While conventional forms rely on promotional techniques using special offers to attract customers (Harmeling et al. 2016). In addition, the subsequent difference is a firm's ability to ‘identify and leverage customer-owned resources’ (Hollebeck et al. 2016). This concerns the marketing objective; an example is LEGO, and they believe they have 120 staff designers but have 120,000 volunteer designers, who are also consumers. They can access them outside the company to help with innovation (Joachim, 2017).

Bernd Schmitt (1999) argues that engagement marketing views the objective from a holistic approach. On the contrary, traditional marketing is more concerned with the amount of money a consumer is willing to pay and their previous purchase habits (Harmeling et al 2016). In addition, communication varies from traditional marketing to engagement

marketing; traditional marketing channels have a restricted unilateral communication flow. However, businesses that engage in engagement marketing see their communication with customers as networking with bilateral communication. Businesses are exposed to a communication network through two-way communication (Harmeling et al. 2016). Subsequent to the concept of pseudo-marketer was introduced.

In contrast to the traditional practices, where businesses enable consumers to use and buy their products or understand the dynamics of the exchange relationship, companies now employ consumers as marketers for the future of their products, resulting in the business directing consumer learning (Harmeling et al. 2016). This draws on Kotler's previous explanation regarding marketing as obsolete. Kotler (2011) describes it as a department within an organisation; his disregard for any external parties influencing marketing practices displays a decayed perspective on marketing that has not withstood the test of time.

Finally, the amount of control of the consumer to impact the outcomes of a business increases when using engagement marketing compared to traditional streams. In engagement marketing techniques, the consumer decides the content from a brand it receives. In traditional streams, the consumer is considered a receiver based on their relationship, not a broader audience (Harmeling et al. 2016). This contrasts with Kotler's beliefs, wherein he believes businesses market to a target audience and not a wider audience. This outlines that Kotler's original definition of marketing is obsolete as the perspectives have developed to a more outstretched description of the concept. In addition, a development by Schmitt (1999) highlights this further, wherein he believes that marketing is everywhere. Schmitt (1999) discussed the term experiential marketing, which is a subcategory in engagement marketing. As mentioned above, Schmitt (1999) acknowledges that businesses who wish to yield more from their marketing practices should stay away from 'features and benefits' and

offer experiences. These concepts were developed before the term engagement marketing but have relied heavily on the industry.

Engagement marketing in a virtual versus physical sense

Engagement marketing has been evaluated in both physical and virtual environments and when the two spheres act in unison. Engagement marketing has included online activities since Vivek et al. (2012) stated that engagement marketing includes ‘Participation in creative events, online activities, product innovation and development events’. Other researchers have omitted this when discussing engagement marketing in a physical sense.

Arnould and Price (1993) suggest multi-sensory effects that can be had in a physical sense that cannot be created virtually. Harmeling et al. (2016) also indicate that ‘active participation’ has a more significant impact and requires mental effort. This is hard to replicate online, and many brands have failed to produce good results. These theories would initiate that engagement marketing carried out virtually is not as efficient or rewarding as engagement marketing through a physical sphere. A campaign run by Red Bull versus a campaign run by Sprite highlights this theory further, whereby the activities carried out physically by Sprite yielded three times the results irrespective of similar budgets and marketing reach (Harmeling et al. 2016).

Further, Harmeling et al. (2016) divide engagement marketing activities into task-based and experience-based. Task-based typically reflects online mediums, while experience-based is in person. It is also recognised that a mixture of both produces better results than when a singular medium is used to promote a marketing campaign; these are considered hybrid engagement marketing strategies. A physical engagement marketing can build a cognitive bond instead of virtual scenarios; these cognitive bonds

create a sense of familiarity that is inaugurated during physical but underlined by the virtual elements (Harmeling et al. 2016).

A case study review was chosen to evaluate the effectiveness of both delivery methods. Whirlpool delivered a campaign in 2014 in which its objective was to provoke emotion and is considered people-powered marketing (Crowdtap 2015). This campaign, called the ‘everyday care project’, allowed potential target markets to interact with the brand and produced 44,000 user-generated content pieces. Sales increased by 6.6% in the following six months (Harmeling et al. 2016). This included a six-time lift in brand sentiment (Crowdtap 2015). Walker's ‘Do us a flavour’ was a hybrid case study that proved very successful. This crowdsourcing campaign included 1.2 million online submissions from the target market demographic. The ‘best’ flavours were released in a pop-up store in times square, New York, in July 2012 (Digital transformation and Innovation 2018). This resulted in 22.5 million online visits and ultimately increased 12% overall sales, four times the forecasted amount (Digital transformation and Innovation 2018).

Buyer behaviour

Buyer behaviour is earliest defined by Engel et al. (1986) as ‘those acts of the individual directly involved in obtaining, using and disposing of economic goods and service, including the decision processes that precede and determine these acts’. Furthermore, buyer behaviour can be defined by Kotler (2011) as ‘the study of how people buy, what they buy, when they buy and why they buy’. The process of buyer behaviour is complex and, therefore, cannot be easily defined. They all concluded that consumer buying behaviour is the process of selecting, purchasing, and disposing of goods and services following customer requirements and desires. However, researchers and academics agree that this process is subject to continuous change throughout time as customer purchase characteristics

alter because of their physical and psychological demands. These changes are out of the control of the consumers and businesses and can often be categorised into the economic stability of the economy, politics, and technology (Dudovskiy, J., 2022).

A business needs to understand how these external factors influence buyer behaviour to set their strategies and cater their products/ services towards the appropriate target market. According to Egan (2007), when a business understands buyer behaviour, they positively contribute to the country's economic state. The practical rationale for using well understood buyer behaviour is that goods and services are predominately superior. Kotler recognises that an understanding of buyer behaviour allows businesses to set their strategies. While Kotler examines that despite significant efforts to investigate buyer behaviour, consumers always do not act rationale and make decisions based on emotional beliefs that are unbeknown to them. (Dudovskiy, J., 2022).

Buyer behaviour can be seen in many different forms, but this research is solely interested in the process. The buyer behaviour decisions process is a 5-step process that includes recognition, information search, evaluation of alternatives, purchase decision and post-purchase behaviour (Qazzafi, 2010).

Many factors, including choice, familiarity, trust, and awareness, can influence buyer behaviour. Marketers are worried about new currencies that consumers value, such as privacy and time. The product or service influences purchasing decisions regarding how expensive the goods are, the frequency of purchase, and the risk associated with the purchase.

Types of Individual buyers

Smith and Zook (2016) outline three different sorts of buyer difficulties that can be addressed using engagement marketing. Extensive problem solving means the customer dwells at the beginning of the process. They have little knowledge of the product, but this is an ideal climate for engagement marketing as the consumer is likely to want to have a high involvement (Smith & Zook 2016). Limited problem solving refers to customers being knowledgeable about the product they intend to buy and spending less time in the early stages of the buyer behaviour process. These customers tend to have already engaged with a brand before on a limited level. Routinised response behaviour is related to consumers with strong brand loyalty and little involvement, but they are resourceful for business. This tends to only happen with smaller purchases with little to no risk attached (Smith and Zook, 2016).

In a Qualitative study carried out by Koban-Roess (2013), this research concedes that females and males have different perceptions, attitudes and behaviours when dissatisfied with an outcome. Women tend not to complain directly to the business unless they have a high level of brand loyalty; nevertheless, women tend to be less assertive than their counterparts and share their experiences with family and friends (Koban-Roess 2013). This is noteworthy for professionals in this industry as initially engaging with females is more straightforward than males. However, complaints also need to be addressed in a standard format to ensure compliance and monotony, allowing the business to accomplish consummate results.

Each type of buyer can be influenced by engagement marketing at different levels, and all give different returns. Showrooming, reviewing, and rewards are three ways businesses could influence each type of buyer at the various stages of their buying 'journey' (Smith and Zook 2016).

Showrooming requires a high involvement rate, so it typically is suited for Extensive problem solving. Limited problem solving requires less involvement than Extensive problem solving but more than routinised response behaviour. While Limited problem solving gives reviews unknowingly for routinised response behaviour benefits, they can also benefit from them to a certain degree. Rewards are typically reserved for the routinised response behaviour buyers as they are regular purchasers (Smith and Zook 2016).

The interception of Engagement Marketing on Buyer behaviour

There is an abundance of literature to support the fact that marketing somewhat influences buyer behaviour, but engagement marketing has never been explored. This is highlighted by East, Wright and Vanhuele (2013), who state that ‘there is a close affinity between marketing and consumer behaviour’. The customer experience was critical for many researchers when looking at engagement as the two topics are closely interlinked. This element of engagement marketing shows how influential one aspect of engagement is for the consumer's decision-making.

The black box model shows that the inputs or stimulus such as engagement marketing or promotion leads to the black box, which is the intervening variables of each consumer and scrutinized under their circumstances and then leads to output or behaviour from the consumers perspective (Smith and Zook 2016) (Kotler 2011). To combat this issue, Llonch, Eusebio and Ambler (2002) and Sheth and Sisodia (2002) agree that managers should use metrics that consider the uncertainties that consumers are exposed too.

Word of mouth is a popular form of engagement marketing but is not fully within the business's control; therefore, it is omitted from this research. The critical aspect to note for the industry is how each of these can be approached to increase the amounts of positive reactions and lead to a

suitable output such as brand loyalty or purchases. Companies that have benefited hugely from engagement marketing are those that adopted practices that increase their personalisation by using relevant content, which is user-generated content (UGC), which leads to the business getting collaborative and being co-creators with their customers (Smith and Zook 2016).

To further evaluate the effectiveness of engagement marketing on buyer behaviour, the professionals should assess the 8P's of the marketing mix. The 8 P's of the marketing mix was constructed by Booms & Bitner (1981) as a service product, price, place, promotion, people, process, physical evidence, and productivity. It is evident from research that engagement marketing has little to do with the actual purchasing of products but more to do with consumers pre-purchasing and post-purchasing habits. O'Dell (2022) suggests there are four main sections of engagement marketing; Contextual engagement, engagement of convince, emotional engagement, and social engagement.

Contextual engagement uses technology to find out what people have said in the past and currently about your business offerings and uses offers or promotions when recognising past purchasing trends (O'Dell 2022). These habits yield high rewards when utilised in the recognition, information search and evaluation of alternatives to the buyer behaviour process. This can be used with any buyer but is most successful when used towards extensive problem solving and limited problem-solving buyers.

An example that can be seen of engagement of convenience used today is the Amazon Dash button. This software was used for customers to repurchase products they considered necessary when they needed them instantly without having to provide card or delivery details (O'Dell 2022). The ease of use allows this engagement to become highly successful. Engagement of convenience mitigates buyers dwelling at the evaluation of

alternatives stage of the buyer behaviour process and instead influences them to make a purchasing decision quickly. This can be utilised for routinised response behaviour buyers as they have low involvement and high brand loyalty.

Emotional engagement is considered one of the most powerful but underutilised tools of engagement marketing; this strategy tracks data points that customers have interacted with, and then the business replicates it to get rewarded. It can aid all types of buyers, as it is considered unconscious buying during the information search, evaluating alternatives, and past purchasing behaviour. Moreover, it allows the business to envisage what the consumers like to interact with (O'Dell 2022) (Mihajlovic 2022). This can typically be carried out virtually or through observations of people, it can only be successful with high investment in technology tracking systems or ongoing high budget projects.

In recent years, social engagement has been revolutionised with the vast expansion of 'influencer marketing' (O'Dell 2022). Social engagement includes the concept that consumers are looking outside of brands for suggestions for what to purchase. Engagement marketing partitioners should use user-generated content (UGC) promotion to influence buying habits at the recognition and information search stages of limited problem solving and extensive problem-solving buyers. Routinised response behaviour buyers typically control this UGC as, during their post-purchase phase, they usually contribute to the UGC that influences other buyers' decisions.

Measuring the effectiveness of engagement marketing practices

The biggest struggle that marketers face is how to measure the efficiency of marketing activities; this is highlighted by the famous quote from John Wanataker 'half the money I spend on advertising is wasted; the trouble is

I don't know which half' (Chait 2015). As customer journeys become extended, professionals need to redirect their focus to procure the most lucrative results from marketing activities. According to Cavaney (2021), 77% of marketers do not know what critical success factors to track, while 55% of marketers' key role was to increase return on investment; this is a traditional view that decision-makers possess. Marketers believe that money was the greatest influence on marketing practices and return using metrics such as lead value and cost per lead. In contrast, engagement marketing can be measured using other variables such as customer acquisition cost and customer lifetime value (Canvaney 2021). These metrics can be examined most accurately by using more significant data analysis derived from extensive primary and secondary data collection and analysis.

Existing literature displays an extensive view of metrics used in marketing practices but no clear guidance on the best metric to evaluate your methods. Furthermore, Davies and Ardley (2012) recognise that discovering a set of universal marketing metrics is a challenging endeavour. The main reason was that each scholar presents different views on the number of metrics; Bendle, Farris, Pfeifer and Reibstein (2021) believe there are 114 metrics divided into nine categories. Ambler (2003) and Clark (2001) acknowledge that the marketing industry is not short on metrics, but it cannot implement the available metrics. Barwise and Farley (2004) highlight the need for non-financial user-friendly metrics that can be more quantifiable to smaller businesses and engagement marketing practitioners. These include market share, perceived product/ service quality, customer loyalty retention, customer profitability, relative price, and customer lifetime value.

Summary and next steps

This research discovered that Engagement marketing impacts buyer behaviour depending on which stage they interact at and the type of buyer that is being influenced. To further investigate this, it would be interesting to observe in-store people interacting with sales assistants undertaking demonstrations of appliances and, after six months, evaluate the return on the investment. It is expected that more case studies and literature will be available that can be compared and contrasted with this study by the time this is carried out. Furthermore, some interviews with decision-makers in the industry could be held; this will allow for a better understanding of the concept and hopefully aid the industry's development.

This research featured no single metric identified in the industry to measure engagement marketing. There is a knowledge gap in the industry in this domain, this could be rectified with further research and prioritising the best metrics to measure engagement marketing.

Conclusion

The objectives of this research were to identify the difference between traditional streams and engagement marketing, the types of buyers that can be affected by engagement marketing and in what stages the buyers are affected mainly by engagement marketing. To fully understand the effectiveness of engagement marketing, the metrics used in the industry needed to be also included in this project. This research paper should aid marketers to explore the phenomena of engagement marketing and assist their strategy development.

There are many differences between engagement marketing and traditional marketing practices; the former highlights the importance of the customer while the latter focuses on financial gains. It is clearly evidence that

engagement marketing affects the buyer behaviour process, especially in the early and post-purchase stages. Each buyer is somewhat affected by engagement marketing, but the critical factor is moving your consumer from limited problem solving and Extensive problem solving to routinised response behaviour. engagement marketing is more suitable for larger, well-established businesses than others, and the results from engagement marketing activities are not always identical. The return from engagement marketing activities is based on investment, communication channels, practices used, and the extent to which the business understands its consumers. Consequently, the engagement marketing marketers need to set out the objectives in line with the overall goals and objectives of the company while being realistic with their expectations. These stimuli need to be accessed fully before considering an engagement marketing strategy.

Research from Koban-Roess (2013) has shown that more consideration should be given to engagement marketing targeted to a particular gender. From this research it has recognised that engagement marketing is easier to influence buyer behaviour than traditional streams, but this is an expensive and needs a degree of expertise or proficiency in the area in order for it to have stable results. This should be considered when considering an engagement marketing, marketing strategy. Marketers must be aware that a broader scope of a project will allow for great rewards.

There needs to be more research carried out on the best metrics to be used in marketing, as there are many differing opinions, as seen above. There is a split in the industry that financial rewards are better than non-financial rewards; the importance is subjective to the business that is implementing the strategy. Marketers should reinvest and trail engagement marketing practices instead of traditional mechanisms as it is likely to yield greater rewards and aid the company reach their overall goals more effectively.

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Milking Technologies: An exploration of Irish dairy operations in comparison to New Zealand.

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Abstract

This project reviews the available literature to compare the operations of dairy farms in Ireland to New Zealand in order to identify possible opportunities for change in Irish practices. Irish dairy farmers have slowly begun to adopt new milking approaches and technologies, but New Zealand farmers have changed at a faster pace. This comparative review highlights the main benefits for farmers who have embraced the latest milking technologies including increased levels of productivity, profitability and efficiency.

Keywords: Ireland, New Zealand, Dairy farming, Milking technology.

Introduction

This project examines the adoption and impact of various milking technologies in the dairy sector in Ireland and compares them to the advancements that have been made in New Zealand. The dairy sector is of high value to the Irish economy, and it is an area that has always been a major part of our economy, culture and heritage. Technology has had a substantial impact in almost every industry worldwide, however, this research project will target how it has changed the milking operations in dairy farming over time and how the sector is constantly evolving in regard to profitability, efficiency, and productivity. By reviewing this, we can learn how other countries such as New Zealand operate their milking technologies and then incorporate it into our own Irish systems.

Historically, innovations in agriculture have tended to be concerned more with the adaptation of existing technologies rather than the adoption of new ones (Van der Veen, 2010). Dairy farming has seen many incremental changes over the last one hundred years, with emphasis on increased efficiency and intensification; for example, cattle have been genetically modified to suit new milking systems and demands, and research shows that there has been a global increase in the volume of milk per cow and herd size over the last one hundred years. This is evident as in 2018, the Irish national herd stood at 1.48 million cows (Heffernan, T, 2018). Furthermore, according to Teagasc (2022), figures have shown that Irish milk production has increased 2% since 2021 and 8% since 2020.

Dairy farming is more than full-time employment, it is seven days a week, three hundred and sixty-five days a year. The work entails quality testing, grassland management, breeding and genetics, winter fodder management, animal health and so much more. This requires a lot of manual labour which ultimately takes up time and effort before any results or profits are noticeable. Therefore, technology is a potential solution to optimise milk

production. Some technological advancements recognised worldwide in the dairy industry are that of the standard milking parlour, rotary milking and automatic milking and these three technologies will be explored in this project. These are said to decrease labour requirements and increase milk production, benefiting dairy farmers in the long term.

There is a comparison to be made about the operations of dairy farms between Ireland and New Zealand, but there are also similarities between the two countries. The Irish dairy industry uses its pasture-based system seasonally, it is heavily reliant on family labour and is considered very unique across the European Union as the majority of European countries rely on indoor systems (Boyle, 2002). For both Ireland and New Zealand, it is extremely important for them to utilise the pasture to optimum levels for the highest possible level of farm profitability. For decades dairy farmers have struggled with labour shortages and had difficulty in hiring suitably skilled staff (Winsten et al., 2010). Similar to the difficulties in Ireland with hired workers, New Zealand farmers also described it as pressing to recruit and retain skilled people for their operations, with forty per cent of farmers experiencing difficulties at all skill levels (Eastwood et al., 2015). The main challenge that farmers are currently experiencing is that young workers in a field are complaining about the lack of career advancement, unsociable working hours, labour management concerns and bad working conditions (Myles, 2000). Both Ireland and New Zealand encounter the same problems when it comes to retaining top quality and highly skilled farm workers. However, as discussed below there are indications that New Zealand is more advanced than Ireland when it comes to the use of technology.

This literature review will investigate the importance of technology in the agricultural sector in Ireland, primarily focusing on the dairy industry. It will also focus on the potential benefits of using different milking

technologies and how Ireland compares to the dairy operations in New Zealand. The main areas that will be examined are standard milking parlour, rotary milking and automatic milking, in relation to productivity, profitability and efficiency. The main questions to be answered in this literature review are ‘What milking technologies have Irish dairy farmers adopted into their operations?’, ‘How successful have these milking technologies been?’ and ‘What can we learn from New Zealand in the way they operate with milking technology to incorporate into our Irish systems?’.

Standard Milking Parlour

The milking process is the most labour-intensive part of dairy farming and is responsible for one-third of the total labour cost (O’Brien et al., 2001). Therefore, in order to achieve high outputs in the standard milking parlour, dairy farmers must increase their herd size in a way that doesn’t require any additional labour costs. In recent times there has been an upward curve for Irish dairy farmers, with the number of herds that are over one hundred cows increasing from 4.5% in 2005 to 23% in 2016 (Teagasc, 2017). In comparison, New Zealand had an average herd size of four hundred and sixteen cows in 2016 (Teagasc, 2017; Dairy NZ and LIC, 2016). The main reason for that upward curve has been the abolishment of the European Union milk quotas in 2015 which were in place since 1984.

These quotas were put in place to stop overproduction, so farmers were only allowed to produce a certain volume of milk per cow or per herd. Irish farmers are now able to become more productive and attempt to increase their numbers in the direction of New Zealand dairy farms because since the late 90’s and early 00’s there has been a rapid expansion in their milk production. They were also responsible for a huge volume of dairy product exports when the quotas were introduced in the EU (Teagasc, 2015). Even though the dairy industry in Ireland only amounts to 7% of our GDP, the

Irish government still think that the dairy industry and agri-food business play a key role as they are Ireland's 'largest indigenous sector' in underpinning exports and economic activity (Bia, 2014).

The standard milking parlour is well-known as the 'Herringbone'. This is the most commonly used milking parlour in Ireland because as mentioned above, many farms in Ireland have smaller herd sizes in comparison to those in New Zealand. These parlours come in various sizes depending on the numbers in the herd and come in units of twelve right up to thirty-two, with a channel down the middle for the labourer to attach and detach the clusters during milking. Labour productivity is and always will be a critical issue, with an impact on the sustainability of dairy farms structures (Donnelly, 2018). When looking at the costs, the standard milking parlour is a much cheaper option to build and maintain as one can always increase the capacity of the parlour by extending the pit if beginning with a smaller herd.

However, it would not be considered the most efficient milking system as there is a lot of walking and turning in the parlour for the labourer, along with the entry and exit of the cows being slower than other systems. Figures have shown that the average time associated with the standard milking process is thirty-three per cent of the total labour input (Deming et al., 2018). Moreover, farmers of one hundred and fifty cows or less spend five hundred and ninety hours a year on just the standard milking process (Deming et al., 2018). A study completed by (Edwards et al., 2013) analysed a collection of data from different Irish farms with standard milking parlours. With an increase in parlour size, there was also a linear increase in milking efficiency and cow throughput. On the contrary, there was a linear decrease in the work routine and operator idle time with the larger parlours. This did not necessarily mean that the larger parlours were more operator efficient, even though they provided a greater cow throughput.

The contrast between Ireland and New Zealand's operations can be considered quite substantial even though they have the same outlook and systems. The Irish labourer's estimated efficiency is 41.3 hours per cow per year with a herd size of seventy-seven cows (O'Donovan et al., 2008). That was a much lower labour efficiency ratio when compared with New Zealand's 20 hr/cow per year with over 3 times as big a herd with two hundred and twenty-nine cows (IFCN, 2002). The reason for this gap between the two countries is that New Zealand has been faster to welcome and adapt to technology in order to improve its labour productivity. This primarily focuses on milking tasks that have improved their labour efficiency and ultimately their profitability (Eastwood and Yule, 2015; Edwards et al., 2013; Jago et al., 2010). This highlights a very important correlation between the increased scale of the milking enterprise and a more positive labour efficiency (Deming et al., 2015; O' Donovan 2008).

Rotary Milking

Due to Ireland's temperate climate, Irish dairy farmers can grow large quantities of grass over a long season (Teagasc, 2022). This results in Irish dairy cattle being fed predominately on grazed grass over the majority of the year and given silage as well as other concentrated feeds during the winter months (O'Mara, 2012). This is where Ireland boasts a competitive advantage over other countries as they have the ability to grow grass forage for a longer spell of time over the course of the year. New Zealand also has cows that are pasture-based and both countries would use the rotary milking system to quite good effect. When using a rotary system, some of the processes are automated but there is still a labour requirement.

The rotary systems operate on a wheel like basis, with the cows mounting and dismounting onto the wheel in different cubicles. The wheel continuously rotates, and the labourer attaches a set of clusters to each cow when they rotate around. The labourer remains in the same position at all

times and simply attaches and removes the clusters in a very efficient manner. The goal for dairy farmers is to create a long-term profitability scale that is comprised of increasing output and reducing labour or associated costs. The rotary milking system is considered where the herd size exceeds two hundred and fifty cows (Murphy, 2012). Therefore, Irish farmers with one hundred and fifty cows or more are now looking at rotary milking systems as a more cost-efficient solution.

These systems allow one to milk more cows, in less time with less labour (Dairymaster, 2022). In 2000, a 60- unit rotary milking parlour was installed on a farm in Killeagh, Co. Cork, the first of its kind in Ireland (Allen, 2015). According to Dairymaster chief executive Edmond Harty, ‘the family had always been ahead of the game when it came to doing things more efficiently and profitably’ (Allen, 2015). Moreover, another Irish dairy farmer called Pat from Co. Wexford stated that there is ‘a much higher output with the rotary, with a difference of 1.5 hours of milking’ (Allen, 2015).

Ireland is ranked 31st in the world in terms of milk production and eighty per cent of our end product is exported, whereas New Zealand is the world’s largest exporter of dairy products and the eighth largest milk producer worldwide. Various studies confirm that the implementation of more intensive production systems contributes to an increase in dairy production (Hedley et al. 2006; Ma et al. 2018; Mounsey 2015; Yates et al. 2010). As herd sizes continue to grow in New Zealand, the need for efficient milking becomes even greater (DairyNZ 2022). The rotary is the second most common milking system in New Zealand, making up about thirty per cent of dairy farms. According to (DairyNZ 2022), ‘44% of the national herd is milked in a rotary’. The main benefit of the rotary milking system is that when working well, it can milk large herds in a labour efficient manner, and this is crucial as it is an important part of maintaining a profitable dairy business.

The majority of New Zealand dairy farms (84 per cent) achieved technical efficiency scores between seventy and ninety per cent, with the remaining 4.96 per cent obtaining scores above ninety per cent (Ma et al. 2018). Thus, a large proportion of New Zealand dairy farmers are technically efficient as a result of using a rotary milking system. In 1984, Ireland and New Zealand had about the same number of dairy cows and were producing a similar volume of milk. Since then, Ireland's output has increased slightly to about 5.5 billion litres while New Zealand's output is hovering at about 20 billion litres.

With labour being one of the most sought-after resources for dairy farmers in both Ireland and New Zealand, it is probably considered to be the dealbreaker in terms of what system the farm installs in their operation. For a typical farm conversion in New Zealand, the 50-bail rotary provided the most labour savings per dollar invested (Teagasc, 2018). It is extremely important to achieve high labour efficiency where possible in regard to rotary systems as they have a higher capital cost than the standard milking parlour. In terms of efficiency levels, the rotary has got a big advantage on the standard milking parlour, with the wheel like operation system, allowing the labourer to work from the one position attaching and dethatching the clusters with great ease. The culmination of quality skilled labourers along with the advancements of technology is the ultimate goal for the dairy farmer. Ideally, the aim is to have a shorter milking time and a reduction in labour requirements to benefit both the farmer and the cows.

Automatic Milking

Automatic milking systems have revolutionised the dairy sector (John et al., 2016). The first automatic milking system was ‘commercialised in the Netherlands in 1992 and the concept has become common around the world, with more than 10,000 farms using the technology’ (Shortall et al., 2016). The main reason why farmers are switching to automated milking is the reduced labour demands which give them more time flexibility, reducing the level of unsociable hours (Hogeveen et al., 2004). When using automatic milking systems, the labour requirements are quite different. They include visual monitoring of milking and cow data, cleaning, and checking off attendance lists on automatic milking systems (Steenefeld et al., 2012). Farmers who have invested in the automatic milking systems have reported improved lifestyles along with more positive mental and physical health (Mathijs, 2004).

Farmers need to build solid financial strategies in order to acquire financing for their modern automatic milking systems and farms in the future. This will allow the investment to give the best labour efficiency as well as financial return. There have been various factors to consider as well as many simulation variants made to assist the farmer in identifying the optimum strategy to choose for their enterprise. It is important for the farmer to understand the correlation between the capital costs, financing structures, price volatility, labour productivity, farm inputs and outputs (O’Brien, Shalloo et al., 2004; Jago et al., 2006). Farmers may choose to adopt to automatic milking systems for reasons other than profit. On the contrary, they may refuse to adopt to automatic milking systems because if they were to adopt these systems, it could create conflict in their own personal values or existing commitment to their systems (Hyland & Bosch, 2015). The Irish farmers can be considered as ‘set in their ways’ and resistant to change. This is primarily down to an emotional attachment to their own systems as it may be continued on from a previous generation.

The primary issue is that milking frequency in the automated milking systems is determined not only by the nutritional conditions and water intake (Halachmi, Ofir et al., 2005) but also other factors such as social structures of a herd (Bach et al., 2007, any layout designs of the farmyard (Halachmi, 2004), any possible health conditions such as lameness that the cow may suffer (Bach et al., 2007) and finally if the cows have to endure long journeys to and from the parlour. Uneven milking frequency can affect the overall health of the cows leading to mastitis (Stefanowska et al., 2000). However, automated milking systems provide the ability to milk more regularly, by assigning different milking frequencies to different cows, and feed them more accurately based of their nutritional demands. Resulting from this, there's a chance that the feed efficiency will improve. In comparison to adopting a total mixed ration, economic returns result in a more profitable manufacturing system. (Bach & Cabrera, 2017).

Dairy farmers must grow their herd size without incurring considerable additional labour costs in order to remain viable. Seventy percent of all labour on dairy farms in New Zealand are taken up by just the automatic milking processes (Jago, 2007). For countries like Ireland and New Zealand, that are pasture based, the existing automated milking systems are impractical to use with grazing, making the greater milking efficiency harder to accomplish. It would require the farmers to install a second and maybe more automated systems. Unfortunately, that puts a real spike in the amount of capital required for the farm. Following studies in New Zealand (Woodford et al., 2015), the most significant perceived barrier is the large amount of capital required.

Unlike many technological advancements, the automated systems could potentially be implemented on both small and large dairy farms. Despite the large commercial organisations providing the automatic milking systems, there still seems to be a lack of professional knowledge to assist the farmers in integrating the system into their farms. There is no doubt

about the increased efficiency and productivity levels with the automatic milking systems, however, the profitability scale will be impacted with the high capital costs involved in adopting the technology.

Conclusion

From the research that has been completed on this project, it is clear to see that technology has played a huge role in the operations of dairy farms worldwide in recent times. Some countries have accepted and adapted to the changes more quickly than others. There are many factors that influence these changes and for some, it can be easier to adapt than others.

When looking at Ireland, we predominately use the standard milking parlour due to our average herd size being considerably smaller in comparison to New Zealand. There is only twenty- three per cent of Irish dairy farms with over 100 cows on the farm. However, that figure is still positive as it has increased from a very low 4.5% which was recorded in 2005 (Teagasc, 2017). That rise is mainly down to the abolishment of the European Union milk quotas that Ireland was confined to for over four decades. New Zealand was never put under such kinds of restraint and so their herd sizes were constantly expanding. With that freedom to expand New Zealand has become the world's largest dairy product export.

There are many factors to consider for a dairy farmer when choosing what system they wish to implement on their farm. The three main systems that were looked at in this research project were the standard milking parlour, rotary milking parlour and automated milking parlour. The standard milking parlour is the most common parlour used in Ireland whilst New Zealand is more advanced and mainly uses either a rotary system or the automated system which has a much-reduced labour requirement. In a sector there is a shortage of staff, and it has major difficulties with recruitment and retention, it would seem that the most efficient system to

implement would be the automated milking system. However, the cost of capital in the automated system is much higher than in the standard milking system.

The two countries that were examined in this research project are pasture based. However, we have noticed that New Zealand has been a lot quicker to embrace the technologies available for farmers to change their means of operation. As stated over the course of the project, New Zealand's farming enterprises are also a lot larger than Ireland with their average herd size over three times that of Irish dairy farms. There are many reasons for the gulf in size between these two countries, Ireland have only a handful of dairy farmers that have been able to invest in the capital and match the herd sizes of those in New Zealand. For many years Ireland couldn't compete with New Zealand as they had a limited level of productivity, but that figure is on the rise as they are slowly beginning to embrace the technologies available and expand their enterprises. Ireland has learned from the New Zealand model, by understanding that the more cows being milked the more profit they can be make. The decision that the farmers need to make is to decide which milking systems best suit their dairy operation.

This project shows that technology has significantly influenced operations in dairy farming and the speed and level of adoption of new technologies has enabled New Zealand framers to be very successful. Irish farmers can reap benefits if they learn from the New Zealand experience including increasing productivity, efficiency and profitability. In order to achieve these goals, farmers have to consider each of the three dairy systems available and find the best fit for their enterprise. Even though Irish farmers have mainly adopted the standard milking systems, many should explore the potential of rotary or automated system into their operations. The rotary system is likely to be the more popular option amongst Irish

farmers because there is less capital investment required and the continued reliance on labour will appeal to the traditional values of Irish farmers.

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An investigation of how management practices may influence productivity in remote work employees in Ireland

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Abstract

The effectiveness of management practice on remote workers productivity has generated much debate and this research explores the issue further. The literature suggests that remote work has been found to have both positive and negative effects on employee productivity. In particular, employee productivity can be influenced by how managers communicate, the extent and types of training provided, and how well-resourced employees are to work remotely. Organisations in Ireland should review existing management practices to identify which should be adapted to ensure productivity levels are maintained or increased.

Keywords: Remote work, productivity, management practices, Ireland

Introduction

This project reviews the available literature to investigate how management practices may influence productivity in remote working employees in Ireland. This will be done by firstly defining the concepts at hand which are remote work, productivity, and management practices. In the 1970s Dr. Jack Nilles attempted to ignite a remote work trend and helped to coin the term ‘teleworking’ (Nilles, 1976). A scan of the literature revealed that the term ‘remote work’ itself appears to have become more popular in the ’90s (Di Martino & Wirth 1990 p.530). Other terms such as ‘work from home’ and ‘virtual work’ were also found and are interchangeable with the term ‘remote work’.

Many definitions exist for remote work (Di Martino & Wirth 1990 p.530, Gajendran & Harrison 2007; Fay & Kline 2011). They all share common characteristics whereby an employee uses information technology as a key component to conduct work in a location separate from their employer’s premises, but these differ in terms of the level of relationship and communication with co-workers. In this project, remote work can be defined as “a form of work that employees perform outside the physical premises of the organisation by utilising communication technology” (Jämsen et al 2022). Gajendran & Harrison, (2007) believes that remote work can take place either full-time or part-time as part of the definition of remote work. With consideration of the global covid-19 pandemic, the context of this report will look at remote work as a full-time work arrangement.

Throughout the 21st century developments in information and communications technology helped to enable organisations to incorporate remote work into their daily work routines and move away from the traditional office environment. These breakthroughs led to organisations across the globe adopting remote work as a modern workplace practice

(Hill 2021). In 2020, the Covid 19 pandemic spread across the globe, to stop the spread of the virus many organisations adopted remote work and the switch was accelerated. (PWC 2020) stated that this had a significant impact on many businesses not only in Ireland but across the globe as the switch to remote work happened within a few days for many

organisations. Businesses looked at remote working as a solution to continuous employment and this caused a paradigm shift in current work strategies. George et al (2021) noted that due to the pandemic the shift to remote work was abrupt and organisations did not have adequate time to plan and implement measures to allow a smooth transition for employees. A report from the end of 2020 by The Central Statistics Office found that respondents reported 46% of employees in Ireland were working either fully or partially remotely and 79% of respondents in the Professional and IT sectors were working either fully or partially remotely (CSO 2020). However, a survey conducted in Ireland on managers stated that 45% believed their organisation did not provide them with the required training to manage remotely, 36% stated that they received basic training and only 19% believe that they received sufficient training to manage remote teams (McCarthy et al 2021). George et al (2021) suggests that many workers and employers believe that remote working will continue on a large scale even when working remotely will not be necessary for health reasons.

Bernolak (1997, p.204) defined productivity as “how much and how well we produce from resources used. If we produce more or better goods from the same resources, we increase productivity or if we produce the same goods from lesser resources, we also increase productivity”. In this report, productivity refers to the time spent by an employee actively executing the role to produce the desired outcomes expected by their employer in their job specification. A productive employee reaps many benefits for an organisation. Conlon (2018) states that a productive employee can increase profitability, improve customer service, seize the opportunity for growth,

improve competitiveness, reduce employee burnout, enhance wellbeing, and improve morale along with many other factors.

There are many studies completed by theorists dating back to the early 1900s on how to increase employee productivity. Scientific Management otherwise known as Taylorism was one of the earliest attempts at improving labour productivity in 1909 by Fredrick Taylor (Taylor 1911). Later in the 1920s, Elton Mayo and his associates counterargued Taylor's scientific beliefs that the highest levels of productivity are dictated by 'the one best way' of completing a task and that way could be gathered by controlled experiment. Mayo's experiment named The Hawthorne studies underlined that the group dynamics and social makeup of an organisation were an extremely crucial force either for or against higher productivity (Ónday 2016). Many theorists have since conducted studies on how to increase employee productivity such as Mary Parker Follet, Abraham Harold Maslow, and Peter Drucker.

The Focus of this project is to examine how managers can effectively manage remote working employees to maintain or boost productivity. Research shows that prior to the pandemic many managers believed productivity would decline with a switch to remote work due to a lack of trust when managers cannot physically see their employees working (Harrington and Ruppel 1999). Similarly, research shows that managers previously have had reservations over whether the employees are actually as productive while working remotely as they would be physically present, this is due to managers feeling powerless in their ability to constantly provide employees with continuous meaningful feedback (Manocheri and Pinkerton 2003) and also a struggle with performance appraisals and assessments without the physical presence of the employee in the workplace (Crandall and Gao 2005). Furthermore, Cooper and Kurtland's (2002) studies found that managers feared the inability to closely monitor their employees and provide them with immediate feedback. Research also

showed managers believed that it would be difficult to build a culture that is accepting and supportive of remote work which may lead to a high employee turnover and in hand affect the motivation and productivity of their teams (Peters et al 2016). According to Greer et al (2014) many supervisors also report “distractions in the home environment of the employees” as a negative impact on employee productivity and thus a drawback of remote work. Research from Peter et al (2016) identified that a unique set of managerial issues may come with remote work such as culture, values, and control practices.

However, with large a number of organisations transitioning to remote work in recent years, there is more research to argue this misconception and shows that productivity tends to remain the same if not increase with the adoption of remote work practice. According to George et al (2021), productivity and working hours can increase as remote work offers employees greater flexibility which can be used to increase working hours as other time-consuming activities are reduced such as commuting, interruptions, etc.

The purpose of this research is to explore the influence that management practices have on the productivity of remote working employees. An important component when transitioning to remote work is the effect on the work and the workers, particularly their productivity. This research will be useful as it aims to scope a better understanding of how management practices can influence the productivity of remote working employees and will be useful for Irish organisations looking to implement practices to ensure productivity levels are maintained or increased with the adoption of remote work. This research aims to contribute to the previous knowledge on this topic.

There can be a lot to learn from other countries’ adoption of remote work. Research in America suggests that managers should assist remote working

employees in setting boundaries to help them to achieve a structured work-life balance and maintain productivity (George et al, 2021). UK research states that there is a need for remote workers to adapt their work style and correspondingly managers should consider the ways in which they supervise remote working employees to ensure the needs of the employee are being met to positively affect productivity (Grant, 2013). This project will explore the remote work experience in the US, and the UK to uncover what management practices Ireland might adopt in order to maintain or increase remote work efficiency.

The key questions to be addressed throughout this literature review are as follows:

1. How have American management practices influenced remote employee productivity levels?
2. How have UK management practices influenced remote employee productivity levels?
3. How have Irish management practices influenced remote employee productivity levels?
4. What management practices can Ireland learn to incorporate from both the positive and negative experiences in the UK and America to increase employee productivity?

The US Remote work experience

This section will explore the experiences of US managers and employees regarding remote work practices. Many large American companies have delayed their return to the office such as Microsoft, Facebook, and Amazon (Weise 2021). Nicholas Bloom, a Stanford researcher stated in an interview that during the pandemic 42 percent of the U.S. labour force was working from home full-time (Wong 2021). US research has shown that management practices can positively influence productivity in remote working employees. A study conducted by George et al (2021) indicated

that employees perceive that their productivity increased when working remotely, a key finding in this research shows that employee productivity increased for managers who articulate a higher purpose. Similarly, Golden (2006) suggests that remote work helped to increase organisational commitment and leads to lower turnover intentions. Another study (Golden and Veiga, 2008) found that individuals with high supervisory relationships while telecommuting experienced the highest levels of commitment, job satisfaction, and job performance. Overall, these studies suggest that management practices that articulate a higher purpose can positively impact commitment, satisfaction, and potentially productivity.

However, it is important for managers to ensure the workload on their employees is being managed and monitored in order to avoid burnout. George et al (2021) suggest that while the intensity of the work had increased on average, the stress on the employee did not due to the employee having more control and flexibility of their time whilst work moved remotely. A survey conducted by (Global Workplace Analytics 2021) in the US found that 55% of respondents stated they work more hours remotely than at the physical office yet only 11% of managers are concerned about employee burnout. However, from the employee's perspective, American workers across the board saw heightened rates of burnout in 2021 according to (APA 2021) survey. The Work and Well-being Survey of 1,501 U.S. workers found that 79% of employees had experienced work-related stress while nearly 3 in 5 employees reported negative impacts of work-related stress with 26% stating a lack of interest, motivation, or energy and 19% noting a lack of effort at work. This indicates that burnout may potentially be overlooked by American remote work managers which can impact employee productivity.

A lot of research has been conducted regarding family life with remote work. George et al (2021) identified a key friction area with the adoption of remote work which is employees noting an intrusion of work into life

leading to a negative impact on the employee wellbeing thus affecting the overall productivity of the employee. (Pwc.ie 2021) research on the US remote workforce has a slightly conflicted view of this belief and states that 79% of respondents rated organisations offering the flexibility to manage family matters as a positive of remote work, they believe it's been a success and has helped to enable employees to maintain or boost productivity. (Gallup 2021) also found in their survey that 37% of employees prefer remote work as it provides them with the flexibility to balance family and home obligations. However, research conducted by (Global Workplace Analytics, 2021) showed that of those working from home during the pandemic, 63% needed to provide care for children or a dependent during the pandemic. According to Eddleston (2015), organisations must educate management and their remote workers on how to make work-life balance easier. This involves educating employees on how to maintain their work-life boundaries without feeling like they are constantly working. The following tactics may be able to mitigate any possible negative effects that remote workers may face. This research may indicate that management should communicate consistently with employees to ensure that they are provided with the training needed to manage family matters and that there is no intrusion of work into their home life.

Managers in America should be aware of the potential impacts of long-term remote work. Golden and Veiga (2005) suggest there may be limitations to the amount of time an individual can work from home beyond the point at which there are diminishing results. Gajendran and Harrison's (2007) studies suggest that employees who have been remote working for one year display a more beneficial relationship with work-family conflict in comparison to those employees with less than a year of experience. (PWC 2021) conducted research that reflects this belief, in their December 2020 survey 52% of executives state that average employee productivity had improved which is an increase of 8% from the

previous survey in June 2020. This indicates that it may take some time and management should ensure there is support in place for when employees make the switch to remote work to maintain or boost productivity.

George et al (2021) also propose another negative impact of remote work being that employees miss out on support from co-workers which may negatively affect their productivity. This is in line with the finding that remote work may lead to social and professional isolation (Kurland and Bailey, 1999; Crandall and Gao, 2005), which overall leads to a lower level of performance due to an impact on employee wellbeing. This would highlight the importance of management in America to check in with employees on their mental well-being to ensure that they are not subject to social isolation which can decrease productivity.

Another area that may affect productivity is technical difficulties for employees working at home. Remote access to networks and data is critical to ensuring and maintaining productivity and employees cannot have technical specialists “troubleshoot” problems as readily when they are at home or working remotely as when they are physically on-site (Mello 2007). A researcher at Stanford University found that only 65 percent of Americans surveyed said they had fast enough internet service to support viable video calls (Wong 2021). This research shows that it is essential for US management to provide technical training and support to employees and ensure their location has the correct internet resources required to work from home in order for productivity levels to increase or be maintained.

The UK remote work experience

This section will investigate the remote work experiences of managers and employees in the UK. There were fewer peer-reviewed sources available in the UK, however, a number of practice-based quality sources were found that were suitable for inclusion in this project. In March 2021, a high of 36% of the UK workforce were full-time remote workers (Office for National Statistics 2021). The same report found that 48.3% of all industries surveyed found increased productivity with the adoption of remote work (Office for National Statistics 2021). Research conducted by

Forbes et al (2020) indicated fewer managers in the UK now believe that presenteeism and long working hours are essential for career progression within businesses. Prior to COVID 19, 57.3% of managers believed that employees needed to be physically present in the workplace to progress, this has now decreased to 37.5% of managers since lockdown.

It is important for management to ensure that employees are properly equipped to work remotely. According to a survey in the UK 74% of employees believe their company should pay for or provide office technology equipment (including laptops, printers, and extra screens) when they work from home (Owillabs.com). Another survey conducted in the UK found that a quarter of the British workers were given minimal equipment to use while working from home and one-fifth of the respondents noted that they are missing some essential items while only 30% stated that they have been provided with everything that is required to work remotely (Currys 2021). Forbes et al (2020) also agree with this statement and found that managers argued that IT equipment and support were not effective when people were working from home and some employees had problems using the available technology. This may suggest that management in the UK is not fully equipping their employees with all the relevant materials in order to increase or maintain productivity. A

survey conducted on 4,000 UK office workers found that as a result of remote work, 30% of employees reported an increase in their hours whilst working remotely (Microsoft.ie 2021). Further research has suggested that employees who are remote working may overwork to reciprocate the permitted flexibility (Chesley 2010). Consequently, remote working may become more unfavourable since employees tend to intensify their work activity (Kelliher & Anderson 2010). For example, remote workers may engage in behaviours such as exchanging emails during non-working hours, a practice that has been linked to stress (Chesley, 2014). This research suggests that employees in the UK have a heavier workload whilst working from home which may lead to stress and employee burnout over time, and this can affect employee productivity. It has been suggested that management should improve communication with remote workers to ensure that workload, well-being, and performance are all monitored (Grant, et al 2015).

Research by Wheatly (2012) suggests that challenges associated with remote work include isolation and career stagnation. A UK survey also noted that 60% of respondents feel less connected to their colleagues and teams, yet only 29% of organisations have introduced additional resources to support the physical and mental wellbeing of employees (Microsoft 2021). Another survey conducted found that 60% of younger workers have struggled to build new relationships with colleagues and 53% with their managers (Total Jobs 2020). However, research from Forbes et al (2020) found that 55.7% of managers provide guidance for well-being since the covid 19 pandemic. According to (CPNI 2021) managers should be able to identify the signs and symptoms of employees with personal issues such as isolation or lack of contact with colleagues by having regular one-to-one online meetings. This implies that management needs to ensure that there is regular communication between employees and their co-workers and management to help employees stay connected and motivated despite not being physically in the workplace.

The Irish remote work experience

Remote work in Ireland increased dramatically with the onset of the covid 19 pandemic. A report from the central statistics office states that “just under one in four (23%) respondents in employment worked remotely at some point before the COVID-19 pandemic but eight in 10 (80%) have worked remotely at some point since. In November 2021, just under two in three (65%) of those in employment were working remotely all or some of the time” (CSO 2021).

Research conducted by O’Connell et al (2009) suggests that there is a strong link between working from home and longer hours of work. This study indicates that the average working week for those working from home is 41.5 hours in comparison to those working in the office working an average of 37.2 hours. This would align with a more recent survey conducted which suggests that 44% of employees working from home find that they are working longer hours at home than they would in the office with 12% finding that they are less efficient working from home and 11% claiming a heavier workload than usual (Irish Jobs 2020). Another recent study also reflects this with 51% responding that they work more hours, on average, when working remotely compared to onsite (McCarty et al 2021). During an opinion piece about remote work, Professor Dundon states to Jennifer O Connell that “This is compounded by the problem of digital presenteeism, or the pressure to be seen to be online and available for work” (Irish Times 2021). With these increased numbers of working hours, Irish employees may become more vulnerable to burnout. Irish managers that overlook this could be at risk of a decrease in productivity in their employees due to burnout levels.

Scholars in Ireland suggest that remote work is linked to increased levels of work pressure and work-life conflict. O Connell et al (2009) suggest that those who are working remotely exhibit higher levels of both work

pressure and work-life conflict than those who were not so involved. This may be due to the breaking down of boundaries between work and home so when employees are working remotely, they may find an intrusion of work into their family life. Similar findings were found in a more recent study, Russell et al (2015) stated “involvement in working from home is associated with greater levels of both work pressure and work-life conflict”. This could potentially indicate that management practices in Ireland may not provide employees with sufficient training to help manage their work-life balance.

In a survey, commissioned by Pure Telecom, 53% of respondents working from home and living in rural locations said they are struggling with remote work due to issues around their location, such as poor broadband infrastructure (NBI 2020). The latest Taxpayer Sentiment survey had similar findings of 51% of respondents from all over Ireland stating they had experienced technical issues due to poor quality broadband in their homes since March 2020 (NBI 2020). This research suggests that the issue of poor-quality broadband infrastructure in Ireland may affect employees’ productivity and that management may overlook resource checks on the employees, thus managers should ensure that the employees’ home broadband is suitable for remote work. Ward (2017) suggests that organisations should review their facilities every eight months to ensure that the appropriate equipment is available as well as secure networking connections to allow employees to work remotely. However, there have been recent advancements and funding for remote work hubs in Ireland (McGee 2022). They may provide stronger broadband connectivity for those employees who struggle with poor broadband infrastructure. This also seems to be an area that some employees may find more suitable. In a recent survey, 24% of respondents who live in rented accommodation that work remotely, would like to do so from a remote work hub or a combination of home, and 44% of these would consider traveling up to 15 minutes to get to one and 45% stating that they would travel up to an hour

(CSO.ie 2022). This research indicates that this can be an area that management can investigate to increase the efficiency of their employees while working remotely, particularly those with broadband issues.

Research conducted in Ireland found that 30% of remote working employees noted social isolation and loneliness were the key issues attached to remote working with 40% of respondents noting reduced interaction with work colleagues (Laya Healthcare N.D). Another recent study undertaken in Ireland reflects this with 72% of remote work employees believing seeing friends, colleagues and teammates would be better working onsite and 51% believe collaboration with both colleagues and customers would be more efficient working onsite, while only 5% believe it would be worse. (McCarthy et al 2021). CIPD (2022) recommends managers “help foster relationships and well-being by making time for social conversations. This increases rapport and eases communication between people who may not meet often. It also reduces feelings of isolation”. This research suggests that Irish managers may also overlook the importance of regular communication between co-workers to help fight against social isolation which can decrease productivity.

What management practices can Ireland learn from both the positive and negative experiences of the UK and America?

From an investigation into the literature, all countries researched in this project link remote working to longer working hours which in turn can lead to employee burnout. In Ireland, the government has implemented the Working Time Act 1997 and The Right to Disconnect Act to partially address the issue of burnout. It will be interesting to see how the government initiative will affect burnout levels in the Irish Remote Workforce. Management in Ireland should ensure to abide by these acts to help address the issue of long working hours which can lead to burnout and thus affect the productivity of remote working employees. UK

research suggests that management should improve communication with remote work employees to ensure that the workload, well-being, and performance are all being monitored (Grant, et al 2015). This may be something that Irish management can implement to help productivity levels to be met. However further research will need to be undertaken to help to confirm this.

Another common issue relating to all three countries in this project is the link between remote work and the lack of communication with colleagues which can lead to social isolation. This may be due to a lack of management practices surrounding the encouragement of team bonding and communication between employees. The advancements surrounding remote working hubs in Ireland may help to combat this issue. If management can identify signs of social isolation in an employee, the manager can recommend for the employee to work remotely in a more social environment however further research needs to be conducted in this area. UK research indicates that management should arrange regular one-to-one meetings with employees to help identify the signs and symptoms of isolation and lack of contact with colleagues (CPNI 2021). This may help to alleviate the risk of social isolation if adopted in Ireland and in turn, have a positive influence on the productivity of remote working employees.

Scholars in America and Ireland agree that there are technological issues surrounding broadband infrastructure with remote working employees. These findings led to the conclusion that Irish managers need to reconsider their remote working programs in order to meet the demands of remote workers who are vulnerable to these issues. Employees may grow frustrated if these issues are not addressed properly, which can lead to a drop in productivity. With the developments in the Remote Work Hubs in Ireland, this may be a solution for Ireland help to alleviate the issue

surrounding broadband infrastructure. However, further research is required in this area.

America and Ireland also shared another common difficulty which is the intrusion of work leading into the home life. US research indicates that management should train remote working employees on how to manage their work-life balance and set boundaries to help reduce the risk of burnout and in turn foster productivity levels (Eddleston 2015, George et al 2021). This may be a management practice that Irish Managers can implement to maintain or boost their employee productivity levels.

While there are issues surrounding remote work, there is also a lot of energy and enthusiasm. To further investigate how management practices influence productivity in remote work employees a case study would be recommended to further investigate the impacts. The overall outcome of the case study would be to hope that the information gathered would highlight how management practices can influence employee productivity in Ireland as we move towards a more remote workforce.

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To what extent do social media video marketing tactics influence Generation Z's purchasing intentions?

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Abstract

There is a growing interest in the literature on purchasing intentions of Generation Z (Ariker and Toksoy, 2017; Alalwan, 2018; Hao et al., 2019; Kim et al., 2020; Liao et al., 2020; Moslehpour et al., 2021; Djafarova and Bowes, 2021; Araujo et al., 2022; Cheng et al., 2022). However, a little research has been done on how designing video adverts which align with Generation Z values and beliefs influences their purchasing intentions. The purpose of this literature review is, therefore, to address this gap in knowledge by offering a unique approach and incorporating relevant scholarly literature from the field of Generation Z consumer behaviour and psychology. The literature suggests that video adverts which align with Generation Z's behaviour and psychology and visual and auditory stimulus from a video influence Generation Z's purchasing intentions.

Keywords: Generation Z; Purchasing intentions; Values and beliefs; Behaviour and psychology; Video marketing; Visual and auditory stimulus

Introduction

The primary purpose of this research is to explore the extent to which the social media video marketing tactics influence Generation Z's purchasing intentions. The relevant literature indicates that video advertisement and any other form of advertisement that accords with Generation Z's values and beliefs are more likely to influence purchasing intentions. However, a gap in relevant literature has been identified. Specifically, there is limited research on how designing video adverts which align with Generation Z values and beliefs influence their purchasing intentions. This research paper attempts to fill this gap.

Firstly, it is important to clarify what is meant by the term 'Generation Z' and 'purchasing intentions.' Generation Z are individuals born between 1997 and 2012 and their age range from nine to twenty-four (Suknanan, 2021). In context of marketing, the main labels associated with Generation Z are digital natives and socially aware (Fromm and Read, 2018). In the Theory of Reasoned Action (TRA) model by Ajzen and Fishbein (1980) purchasing intentions can be defined as consumers' wish to purchase a product or service (Mehyar et al., 2020). Social media plays a significant role in influencing Generation Z's purchasing intentions as Moslehpour et al. (2021) argue that when making any purchase decisions, consumers rely on social media.

It is important to understand the challenges marketers face when influencing Generation Z's purchasing intentions. Marketers struggle to grab Generation Z's attention and ensure good delivery of marketing messages. This is because of the following reasons. Wright et al. (2010) indicates that many marketers advertise on social media, therefore, it is challenging to have unique attention-grabbing adverts. Along with that, on average, Generation Z will pay attention to content for a span of eight seconds which makes delivering marketing messages difficult (Tabassum

et al., 2020; Fromm and Read, 2018). Various scholars assert that Generation Z's certain behaviour makes them resistant to engaging with adverts (Hossain, 2018; Fromm and Read, 2018; Gutierrez et al., 2019; Mogaji et al., 2020; Djafarova and Bowes, 2021). These challenges can act as a useful guide to design a video marketing strategy tailored for Generation Z customer. There will be practical benefits arising from this literature review. This research paper could provide insightful findings to these issues allowing marketers to improve their marketing practices towards Generation Z and ultimately influence their purchasing intentions.

In an attempt to address the above, the following research questions must be explored.

- i. To what extent do video advertisements and visual and auditory stimulus in video help and/or hinder Generation Z's purchasing intentions?
- ii. To what extent do Generation Z's psychology and behaviours help and/or hinder their purchasing intentions?

To explore these questions focus will be placed on seven video marketing tactics that are likely to influence Generation Z's purchasing intentions as follows: (a) the extent to which brands signal the message of sustainability by designing green video adverts influences Generation Z's purchasing intentions; (b) to what extent brands narrate authentic stories about their practices in video format influence their purchasing intentions; (c) the extent to which engaging video advert with music influence Generation Z's purchasing intentions; (d) to what extent interactive clickable video advert influence Generation Z's purchasing intentions; (e) how influencers showing a product in use influences Generation Z's purchasing intentions; (f) how designing short videos and using social media platforms that allows the posting of short videos influences Generation Z's purchasing intentions; (g) to what extent does showing personalised videos influences

Generation Z's purchasing intentions. Each of these tactics will be explored separately.

Designing Green Video Adverts

Liu and Liu (2020, p.1) cites Banerjee et al. (1995) and defines green advertising as “commercial advertising that uses an environmental theme to promote products, services, or corporate public images.” Designing a video advert tailored to target audiences' likes and values is crucial to influence purchasing intentions (Mohammed and Alkubise, 2012). Vieira et al. (2020) and Fromm and Read (2018) indicates that Generation Z are environmental conscious. Therefore, this research paper focuses on using environmental sustainability as the dominant theme of designing a video advert. Since Generation Z are concerned about environment, the question of to what extent their purchasing intentions are influenced by designing green video advert arises.

Generation Z wants companies to demonstrate integrity towards environment and have a positive attitude towards ethical businesses because they are more aware of environmental issues (Vieira et al., 2020). Ghosha (2011) points out that due to this there has been a paradigm shift from designing traditional marketing adverts to green adverts. In the Theory of Planned Behaviour (TPB) model by Ajzen (1991), attitude can be defined as a person's positive or negative evaluation of performing a specific behaviour. According to TPB theory, when individuals have a more positive attitude, their behavioural intentions is likely to be more positive (Chen and Tung, 2014; Wang et al., 2020). Ariker and Toksoy (2017) and Zhang et al. (2018) makes an interesting observation that Generation Z have positive attitude toward green adverts and are willing to pay a higher price for products of companies engaging in Corporate Social Responsibility (CSR). This means Generation Z's positive attitude

such as “good feelings” of purchasing green goods positively influence their purchasing intentions (Liao et al., 2020, p.5).

Moreover, Generation Z are characterised by the unique trait of wanting to bring positive changes in the world (Fromm and Read, 2018). When brands signal the message of being involved in environmental issues through adverts, Generation Z customers' goodwill “to help others” and “empathy-driven motivation” to help society, influences their purchasing intentions (Liao et al., 2020, p.5). In addition, under, Signaling Theory, through video adverts, the marketer sends a message regarding environmental concerns to trigger Generation Z attitudes and behaviour towards green purchasing. If the signal is strong, Generation Z's instincts could be triggered (Liao et al., 2020). The Fear Instinct potentially makes Generation Z pay attention to frightening environmental issues, while the Negativity Instinct could evoke the perception that world issues are getting worse due to the power of negative stimuli. As a result, Urgency Instinct might cause them to be more alert and take an action to solve environmental issues (Rosling et al., 2018). This indicates that these instincts could be persuasive enough to make a purchase intent in hope of solving the world issues.

YouTube video advertisement are effective among Generation Z consumer as they “desire to buy products that are promoted on YT” (Duffett, 2020, p.11). Furthermore, visuals in video play a vital role in influencing Generation Z's buying intentions. This because visuals assist in attracting consumers' attention (Xue and Muralidharan, 2015). Dwivedi et al. (2020) state that visual content increases trustworthiness. Hartmann et al. (2016) and Schmuck et al. (2018) argues that showcasing nature picture in advertisement influences consumers' perceptions of the advertised brand's ecological image, which form positive emotion toward the brand. This in return leads to advert acceptance and buying intentions (Xue and Muralidharan, 2015). In addition, the literature in environmental

psychology confirms that exposure to pleasant nature scenery images in advertisements induces positive emotional responses; this positively influences purchase intentions (Hartmann et al., 2016). These scholarly points suggests that most of the time people are irrational and tend to rely on emotions to make purchase decisions (Tversky and Kahneman, 1974; Kahneman, 2012).

However, it is important to consider that Generation Z consumers do not base product purchase decisions primarily on environmental attributes (Alniacik and Yilmaz, 2012). Alniacik and Yilmaz (2012) and Zhang et al. (2018) indicates that Generation Z trust can be eroded if they find out that the advertising company who claims to be environmentally friendly engages in green washing. Schmuck et al. (2018) and Zhang et al. (2018) says that this is because greenwashing can negatively influence Generation Z's perceptions of the brands because consumers perceive greenwashing as an attempt to deceive them. Furthermore, vague environmental claims could be left unnoticed as Generation Z consumer are good at differentiating between specific and vague environmental claims (Alniacik and Yilmaz, 2012). This could negatively influence Generation Z intention to make a purchase and discourage them from building long-term relationship with the brand (Zhang et al., 2018).

Brand Storytelling Videos

Brand storytelling can be defined as brands using narratives to create an emotional connection with their customers. Brand storytelling gives businesses an opportunity to promote their values and beliefs (Digital Marketing Institute, n.d.). It is evident that Generation Z values brands being open about their practices (Kim et al., 2020) and are influenced by authentic brand stories and prefer video content (Fromm and Read, 2018). Considering this, focus will be provided on to what extent brands narrating authentic brand stories through a video influence Generation Z purchasing

intentions. The relevant literature highlights that Generation Z expects companies to be more open and transparent about their practices and are willing to support brands who implement this (Kim et al., 2020). Fromm and Read (2018) followed by Wang (2021) says that Generation Z are likely to purchase from brands that practise authenticity and transparency.

Furthermore, Generation Z expect marketing to be more engaging (Fromm and Read, 2018). Narrative adverts are likely to engage Generation Z in the message of the advert (Tabassum et al., 2020). This is because according to Dessart (2018, p.290) storytelling helps consumers to become immersed in the brand story, in fact the consumer “gets lost in it” by detaching themselves from reality. In addition, Wang and Huang (2022) argues that narrative adverts are persuasive because people tend to comprehend information in a story format. Along with that storytelling can be twenty-two times more memorable when compared to other types of information as storytelling allows Generation Z users to understand and remember more information (Rodriguez, 2020). This is because storytelling assists in information processing leading to higher brand recall. This positively influences purchasing intentions (Dessart and Pitardi, 2019).

Moreover, Generation Z viewers prefer video adverts and are conditioned to handle mass amounts of visual stimuli (Fromm and Read, 2018). Video adverts consists of visual cues such as dynamic movements and colours and auditory cues such as sounds which assists in transmitting rich information to catch consumers’ attention (Hao et al., 2019). Lim and Childs (2016) indicate that visual stimuli evoke imagery information processing, while auditory stimuli induce discursive information. The S-O-R (stimulus-organism-response) model suggests that more information reduces perceived risk and have a positive influence on purchase intention (Hao et al., 2019). Furthermore, video marketing received “unexpectedly high” engagement (Fazliza et al., 2020, p.3781) because Generation Z

regard short video clips when it comes to intaking information (Kahawandala and Niwunhella, 2020).

Fromm and Read (2018) followed by Vieira et al. (2020) argues that Generation Z are careful about how they spend their money. They do extensive research to find the ideal product which fulfils their personal value. Brand storytelling allows Generation Z to determine whether a company's practices accord with their values (Omoruyi and Chinomona, 2019). Theory of Planned Behaviour (TPB) model by Ajzen (1991) suggest that positive attitude towards a brand influence behavioural intentions (Wang et al., 2020; Chen and Tung, 2014). Thus, if the brand stories accord with Generation Z values, this creates a positive attitude towards brand and ultimately have a positive influence on Generation Z's purchasing intention (Araujo et al., 2022).

However, Generation Z are sceptical and resistant to believe that brands are authentic and transparent (Fromm and Read, 2018). In addition, if Generation Z consumers find out that the brand is narrating false stories, this frustrate and disappoint Generation Z consumers leading to negative brand image (Wang, 2021; Wong and Chung 2021). The Theory of Planned Behaviour (TPB) model by Ajzen (1991) suggest that negative attitude towards a brand hinders behavioural intentions (Wang et al., 2020; Chen and Tung, 2014). In addition, Hossain (2018) asserts that negative attitude towards a brand can create negative emotions toward an advert, leading to behaviours such as intentionally ignoring an advert and installing advert blockers. Moreover, teens have preferred brand and personal buying habits (Fromm and Read, 2018). Along with that, Kutlák (2021) argues that Generation Z prefer to save money. These scholarly points suggests that Generation Z's intention to make a purchase could be hindered.

Engaging Videos

Engaging videos can be defined as appealing videos which attract and hold the attention of video advert viewers (Hollebeek, 2011). Fromm and Read (2018) shows that Generation Z desire engaging video content. Previous studies reveal that high level of engagement contributes to positive emotional reactions, brand perceptions, and purchase behaviour (Hwang and Oh, 2020). Using music or humour is a clever technique to make video adverts engaging and entertaining for Generation Z (Fromm and Read, 2018). This research paper focuses on how music in adverts influences Generation Z purchasing intentions.

Relevant research by Lantos and Craton (2012) suggests using music which is fun and exciting in nature is likely to influence younger customers' purchasing intentions. Adding to this it is worth acknowledging that TikTok enables creation of video adverts with fun and exciting music (Montag et al., 2021) and TikTok's video adverts are likely to influence purchasing intentions of younger customers (Dwinanda et al., 2022). The work of aforementioned scholars suggests that TikTok adverts with fun and exciting music is likely to influence Generation Z's purchasing intentions. In addition, music in adverts influences younger consumers' choice among brands (Lantos and Craton, 2012). This is because music in adverts hinders critical processing of the advert content (Krishna et al., 2016) and scholars argue that the majority of human decision making like intention to make a purchase is done intuitively or unconsciously (Kahneman, 2012; Cuesta et al., 2018).

Previous studies have suggested that music has a positive effect on impulse purchase (Djafarova and Bowes, 2021). This is because consumers' mood can be manipulated via music (Craton and Lantos, 2011). Scholars suggest that music in video advertisement influences Generation Z customer's mood positively which leads to better advert persuasion and brand recall

(Krishna et al., 2016; Craton and Lantos, 2011). The persuasiveness of music is based on Generation Z's ability to "get lost" in the advert's story because music reduces critical processing, thereby positively influences purchasing intentions (Krishna et al., 2016, p.145). To elaborate, younger Generation Z customers have lower advert persuasion knowledge. This could make the advertisement more convincing and appealing as younger Generation Z viewers are less critical about the persuasive tactics used by advertisers (Youn and Shin, 2019).

Much research has been conducted to find the relationship between music in adverts and purchasing intentions. Gorn (1982) research investigated the ways in which music could influence a consumer's purchasing intentions. A key finding of Gorn (1982) research suggests that when subjects were not in a decision-making mode, the adverts with music appeared to be more influential because background music used in advertisements become associated with the product being advertised which helped in product recall. This is because music helps in formation of memory that is associated with advert content. In fact, Craton and Lantos (2011) find that when advert viewers cannot recall the message of the advert, advert music assists in creation of auditory memory that can assist recalling an advert's emotional and visual elements. Consumers behaviour like intention to make a purchase can be influenced by anchoring bias because they rely on heuristics to make irrational decision based on the first information they can recall (Tversky and Kahneman, 1974; Furnham and Boo, 2011).

However, using music can also be a pitfall when it comes to influencing purchasing intentions. An attention-grabbing music can distract Generation Z viewers from paying attention towards marketing message; this can negatively affect brand recall and hinder Generation Z's intention to make a purchase (Craton and Lantos, 2011). Scholarly work tells that influencing purchasing intentions through music is complex. This is

evident in the work of Lantos and Craton (2012) as they demonstrate that consumer's taste for music varies, and individual's personality and mood state could influence a consumer's response to music in an advert. Older Generation Zs have been exposed to multiple advertisements; therefore, they have become an expert at picking manipulative advertisement techniques and disregarding the advert (Djafarova and Bowes, 2021; Fromm and Read, 2018). This suggests that older Generation Z do not get easily swayed by the persuasive techniques (Djafarova and Bowes, 2021). This has a negative impact on purchasing intentions.

Interactive Videos

Interactive videos can be defined as videos that allows viewers to get actively involved in the video through actions such as clicking, dragging, and hovering (Parker, 2022). Generation Z consumers like interactive videos (Fromm and Read, 2018). According to Hwang and Oh (2020) interactive adverts increase affective and cognitive engagement thus having a positive influence on purchasing intentions. Marketers can utilise various tactics namely, live streaming videos and 360-degree videos to make their content interactive. 360-degree videos are immersive video recordings where a view of every direction is recorded (Cameron, et al., 2020). For this research, focus will be provided on 360-degree videos.

Generation Z learned how to interact with screen using pinch and swipe motions from a young age (Fromm and Read, 2018). Rahimizhian et al. (2020) points out that 360-degree video's visual and auditory stimulus and the interactive functions such as zooming and rotating the video impacts Generation Z's cognitive thinking and make them feel as if they are seeing and touching the product. To follow up, Generation Z viewers are likely to rely on heuristics when evaluating products. This reduces critical thinking and leads to more irrational purchase decision (Kim et al., 2020).

Furthermore, Generation Z viewers have short attention span therefore they prefer processing information through visuals (Szymkowiak et al., 2021; Fromm and Read, 2018). It is important to note that the images of a product in an advert is the primary source of information which influences consumer's decision to make a purchase decision (Ma et al., 2020). Relevant research argues that 360-degree videos have detailed and accurate imagery of the product, allowing Generation Z to pick up on visual cues and process product information and functionality better. This has a positive impact on purchasing intentions (Kim et al., 2020; Rahimizhian et al., 2020) because having more information reduces perceived risk associated with making a purchase (Hao et al., 2019).

Research has shown that consumers expect adverts to be enjoyable and entertaining (Martins et al., 2019), in fact Generation Z viewers value fun and entertaining videos (Fromm and Read, 2018). 360-degree videos induce greater sense of enjoyment. Primary research by Vettehen et al. (2019) was conducted to investigate this statement. In this research participants were shown 360-degree and 2D adverts and then their responses on enjoyment levels were recorded. After watching the 360-degree video, one of the participants reported "I did enjoy myself watching the... video" (Vettehen et al., 2019, p.28). The research concluded that 360-degree adverts are more enjoyable than 2D. Enjoyable adverts are likely to influence Generation Z's purchasing intentions (Vettehen et al., 2019). This could be because enjoyable and entertaining videos are considered to be attention-grabbing and an attention-grabbing advert is like to positively impact Generation Z's intention to make a purchase (Martins et al., 2019).

Ausin-Azofra et al. (2021) points out that navigating through 360-degree videos requires greater cognitive effort and Generation Z consumer can experience cognitive overload. Relevant research suggest that cognitive overload can decrease viewer's ability to process information leading to

poor logical thinking. de Jong's (2010) research on cognitive load theory confirms this by explaining that overload of various stimulus can deplete information processing leading to more irrational purchase decision making.

Generation Z consumer desire increased speed and instant feedback (Duffett, 2020; Madden, 2019) and it has been shown that 360-degree videos often have poor loading speed (Le et al., 2018). This indicates that Generation Z viewers might find it troublesome to navigate around the 360-degree videos which could trigger negative emotions. Fromm and Read (2018) says that Generation Z customers are often multitasking by switching between different applications and devices. Multitasking leads to limited engagement towards a particular task, negatively impacting the ability to remember information (Kim et al., 2020). This has negative impact on purchasing intentions.

Video Advert of an Influencer

Several key points are important in relation to the video advert of an influencer. Tabassum et al. (2020) makes an interesting point that Generation Z follow influencers on social media and are likely to purchase products that are endorsed by them. Firstly, a video endorsement from a micro-influencer positively influences Generation Z's purchasing intentions because micro-influencers come across as authentic, trustworthy, and relatable (Foos, 2020). Therefore, according to Veirman et al. (2019) and Masuda et al. (2022) Generation Z consider these influencers as a credible source of information and form a parasocial relationship with these role models which may influence their purchasing intentions.

In sharp contrast, relevant literature exemplified by Veirman et al. (2019) argues that Generation Z are sceptical therefore face a dilemma between

the influencer being truthful towards their followers or being loyal to the brand they are promoting. Fugate (2007) points out that once consumers form a negative perception of an influencer they tend to avoid interacting with that influencer. This negative feelings towards a brand's celebrity affects brand reputation having a negative impact on purchasing intentions (Veirman et al., 2019; (Reinikainen et al., 2021). Despite of this, influencer marketing is powerful because, younger Generation Z consumers fail to critically evaluate that using influencers is a manipulative scheme by marketers to trigger purchase intent because their advertising literacy is not fully developed (Veirman et al., 2019).

Secondly, video of an influencer showing product can influence purchasing intentions. Generation Z prefer to gather information about a product before making the final purchase decision (Fromm and Read, 2018). In fact, Lou and Kim (2019) concur that teens rely on advice of YouTube influencer to decide what to purchase. Perceived risk of using a product reduces and purchasing intentions increases when Generation Z consumer have more information. Videos of micro influencer using a product stimulates visual and auditory senses which makes understanding information about a product easier (Hao et al., 2019). In addition, Cheng et al. (2022) and Flavián et al., (2017) suggests that product usage video allows Generation Z consumers to mentally imagine using the product. This in return positively influences Generation Z's purchasing intentions and reduces perceived of risk of using the product (Flavián et al., 2017; Hao et al., 2019).

Thirdly, Generation Z have grown up in digital age. Because of this they struggle to socialise in person, and often feel lonely and seek comfort by interacting with relatable micro influencers (Pichler et al., 2021; Madden, 2019). In fact, teens built a close relationship with micro influencers and consider them as their friends (Lou and Kim, 2019). Welcoming visual cues such as smiling facial expression and approaching behaviour of the

endorser facilitates social interactions. These positive emotions of an influencer assist in Generation Z developing positive connection towards the endorser because humans are social animals (Lee and Theokary, 2021; Zhu et al., 2022). Adding to this research done by Lee and Theokary (2021) shows that positive emotions are contagious. When Generation Z are exposed to an influencers' positive emotions, they experience a change in their own emotional state because they automatically mimic emotions of the influencer. Once Generation Z viewers engage in mimicking behaviour, they develop a positive connection with the influencer. These scholarly points suggest that visual cues such as positive facial expressions and body language facilitates in building relationship of trust between the influencer and Generation Z viewer. Scholars have confirmed that positive bond with an influencer endorsing a product result in positive impact on purchasing intention (Lou and Kim, 2019; Lee and Theokary, 2021; Zhu et al., 2022).

Lastly, the empirical evidence suggests that Generation Z value brands who practise ethnic diversity (Fromm and Read, 2018). Wang (2021) suggests that brands that are more inclusive and diverse when recruiting endorsers for their video advert are likely have an improved image in the eyes of Generation Z consumers. The work of scholars suggests that ethnic visual cues in an advert encourage Generation Z consumers to develop more positive attitude towards the advert, enhance advert recall (Madadi et al., 2021) and builds positive attitude toward the brand (Lee and Kim, 2019). This more likely to have a positive influence on Generation Z's purchasing intentions (Wang et al., 2020). However, using the message of diversity in advertisement might not grab Generation Z viewers' attention. Fromm and Read (2018) suggests that this is because Generation Z are sceptical and are aware that businesses fall short of the values they espouse. This indicates that it can be challenging to influence purchasing by sending signal of diversity.

Video Optimisation

Social media video optimisation is defined as increasing brand awareness by displaying video adverts on relevant social media channels (Digital Marketing Institute, n.d.). Generation Z have shorter attention span (Tabassum et al., 2020; Fromm and Read, 2018) hence they prefer video content (Fromm and Read, 2018). Marketers optimise their videos on platforms such as TikTok and Snapchat as it allows to publish short digestible video content. Generation Z prefer short video clips when it comes to intaking information (Kahawandala and Niwunhella, 2020). Hao et al. (2019) suggest that this enhances information processing allowing access to more information and positively influences purchasing intentions.

Social media advertisement has a positive impact on the purchasing intentions of Generation Z (Alalwan, 2018; Dwinanda et al., 2022). Generation Z are often considered “digital natives” and is the first generation to have grown up surrounded by digital communication and are likely to be exposed to digital advertising on social media (Djafarova and Bowes, 2021, p.1). Before uploading a video advert on social media, marketers make use of transcription, hashtags, or video title which improves the video ranking in the search results leading to more views and clicks (Choudhari and Bhalla, 2015). High number of views attract Generation Z because it seems to be the popular option and if the video content satisfies their values and seems credible, the chances of their purchasing intentions being influenced is high (Yuksel and Akar, 2016).

However, according to Zha and Wu (2014) if marketers excessively flood all social media search engines, the brand could appear intrusive and interruptive. When interruptions increase, the span of attention decreases (McRae et al., 2010) and intrusive adverts could be irritating (Gutierrez et al. 2019). Martins et al. (2019) and Hossain (2018) suggests that due to

this the advertisement could be left unnoticed, thus having no impact on purchasing intentions. In sharp contrast, excessively optimising adverts on social media could be a beneficial strategy when it comes to influencing purchasing intentions because through optimisation Generation Z will be more exposed to an advert leading to better brand recall. Availability heuristic suggests that people's behaviour such as intention to make a purchase is influenced by the first piece of information that is readily available in their mind (Tversky and Kahneman, 1974).

It is important to consider that Generation Z are often switching between devices; viewing different social media applications and interacting with many social media advertisements all at once (Fromm and Read, 2018). Studies in neuroscience and brain imaging have stated that it is impossible to give equal attention to each task while multitasking. Human brain can only concentrate on one stimulus at a time. If two stimuli compete and Generation Z are faced with constant distraction of switching between tasks. This shows that attention towards an advert decreases thus having no impact on purchasing intentions (Kim et al., 2020; Romaniuk and Nguyen, 2017; Ralph et al., 2013). In sharp contrast Fromm and Read (2018) makes an interesting observation that Generation Z's brains have adapted to their digital environment which makes them better at multitasking and processing massive amount of information. Generation Z can filter out marketing content within eight seconds window and pay attention to content which they find interesting and valuable. Marketing information which is perceived to be valuable and enjoyable has a positive impact on purchasing intentions (Wang, 2013).

Personalised Videos

Personalised marketing can be defined by brands delivering individualised content to recipients through data collection (Salesforce, n.d.). The empirical evidence indicates that personalised video advertisements which

targets Generation Z and accords with their interest receive a higher level of engagement (Mogaji et al., 2020; Dwinanda et al., 2022) because personalisation enhances Generation Z user's experience (Gutierrez et al., 2019). Furthermore, Youn and Shin (2019); Madadi et al. (2021) and Dwinanda et al. (2022) indicates that personalised video adverts provide useful information, increases advert value, attention, and acceptance, and lowers advert avoidance. Tran (2017) asserts that this ultimately have a positive impact on purchasing intentions.

However, to deliver relevant personalised content to Generation Z, marketers have to collect personal data on activities such as clicks and likes (Behera et al., 2020). Generation Z are concerned about their privacy (Fromm and Read, 2018). They perceive ads as intrusive when they find that their private information is used for marketing purposes without consent (Youn and Shin, 2019). Mogaji et al. (2020) explains this is because Generation Z customers perceive collecting personal data as harmful and unethical due to the concerns relating to the intrusive tactics advertisers put in place to collect the data. In addition, such intrusiveness leads to negative emotions, such as disturbance and irritation, and behavioural effects such as advertisement avoidance (Gutierrez et al., 2019). Generation Z customers will be more sceptical and could engage in behaviours such as using adverts blockers or skipping and ignoring the advertisements (Mogaji et al., 2020; Hossain, 2018). This has a negative impact on Generation Z's purchasing intentions.

Theoretical Framework & Direction for a Further Research

The figure below illustrates the structure of the literature review and the relationship between various ideas. This research outlines various video marketing tactics preferred by Generation Z customers. It then explores to what extent these tactics influences their purchasing intentions by discussing Generation Z's psychology and behaviour.

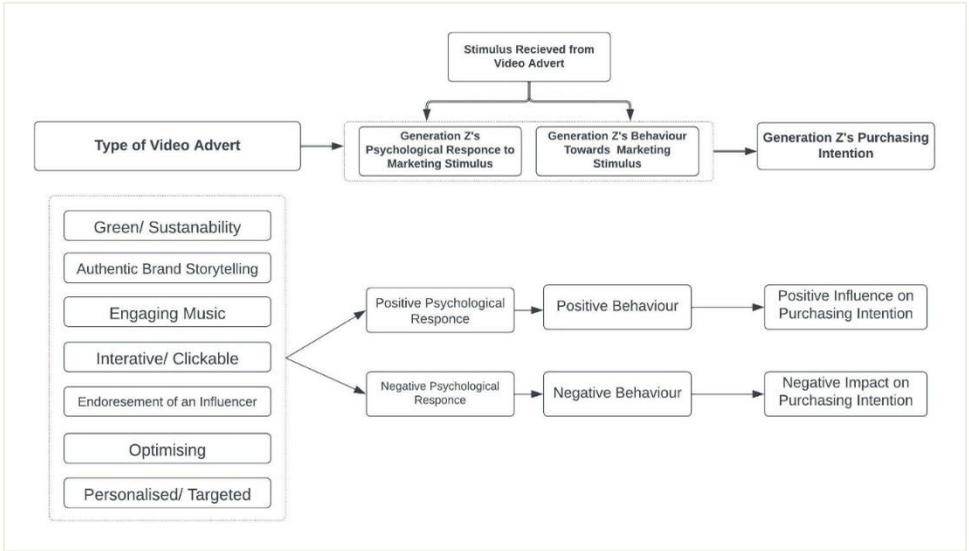


Figure 1: Theoretical Framework

The purpose of this research was to explore to what extent social media video marketing influences Generation Z's purchasing intentions. This research topic has relevance in the future and there is limited literature available on younger Generation Z consumer. Therefore, further primary research and longitudinal studies are required as they will lead to valuable findings which can significantly improve marketing practices. The theoretical framework diagram will aid in further data collection.

Studying Generation Z psychology and behaviour will be an important marketing strategy in the future. This is because Generation Z has purchasing power and can bring revenue into the business (McKinsey, 2020). In addition, Generation Alpha will have purchasing power in the future. Generation Alpha is the name given to the generation who succeeds

Generation Z (Shaw, 2020). However, Generation Alpha is the new age cohort therefore, limited marketing research is available on them. Generation Alpha and Generation Z share similar traits. This means marketers can use existing research on Generation Z to understand Generation Alpha and be more prepared to market at Generation Alpha. Furthermore, studying how to video market on social media will be relevant in the future. Deloitte Insights (2022) predict that demand for short social media video will increase significantly, and video adverts can trigger buying behaviour. This means marketers will have to adapt to this trend and learn how to video market on social media.

Contribution and Conclusion

There is a gap in the relevant literature indicating that a little research is done on the extent to which social media video adverts that accords with Generation Z values, beliefs and behaviour influence their purchasing intentions. The aim of the project was to address this gap and offer a unique perspective on how Generation Z's behaviour and psychology and auditory and visual stimulus received from video adverts have a direct influence on their purchasing intentions. The research drew upon various scholarly material to provide meaningful insights which could help marketers to improve their video marketing strategy for Generation Z.

Relevant literature indicates that video stimulates visual and auditory senses which makes understanding information easier (Hao et al., 2019). This is because according to Lim and Childs (2016) stimuli evoke imagery information processing, while auditory stimuli induce discursive information processing. In addition, visuals and audio are appealing therefore, they lead to high engagement. An example of this is music (auditory stimuli). Music enhances advert engagement and has a positive influence on impulse purchase (Djafarova and Bowes, 2021). However, Craton and Lantos (2011) assert that an attention-grabbing music can

distract Generation Z viewers from paying attention to marketing messages and have no influence on purchasing intentions.

Also, the literature review shows that Generation Z's certain traits helps in influencing purchasing intentions. Ariker and Toksoy (2017) argues that they have awareness on world issues and are likely to purchase from brands that are ethical and contribute towards society. They desire interactive video content (Fromm and Read, 2018) and high level of interactivity with marketing content increases affective and cognitive engagement thus having a positive influence on purchasing intentions (Hwang and Oh, 2020). Adding to this Tran (2017) makes an interesting observation that Generation Z like personalised marketing and personalised video adverts provide useful information which ultimately have a positive impact on purchasing intentions. It is worth nothing that Generation Z consumers' purchasing intentions are influenced by micro-influencers because they come across as authentic, trustworthy, and relatable (Foos, 2020).

In addition, the literature suggests that Generation Z have certain traits which hinder their purchase intention. Generation Z are sceptical and are resistant to believe in marketing information (Fromm and Read, 2018; Alniacik and Yilmaz, 2012). Gutierrez et al. (2019) says that adverts can be intrusive which leads to negative emotions such as disturbance and irritation, and behavioural effects such as advertisement avoidance. Generation Z have shorter attention span therefore not pay attention to an advert (Fromm and Read, 2018). The work of Kim et al. (2020) mentions that Generation Z are often multitasking by switching between different applications and devices, multitasking leads to limited engagement towards a particular advert.

Future trends indicates that, video adverts are a crucial content marketing strategy to market Generation Z as it leads to more engagement and

positive buying behaviour. Adverts that accord with Generation Z values, belief and behaviour are likely to influence purchasing intentions. However, consumer engagement is still a challenge as people tend to avoid interacting with adverts for various reasons.

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What impacts are farming practices having on the levels of greenhouse gas emissions (GHG's) in the beef sector in Ireland, and can better outcomes be achieved

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Abstract

In this paper, the relationship between livestock production and carbon emissions in Ireland is examined. Eight areas in agriculture that are recognised as either contributing to the problem or having the potential to offer solutions are discussed. Potential mitigation strategies that may be feasible are suggested based on recent scientific research, technological advances and a review of the literature relating to greenhouse gases. The main findings of the project suggest that livestock numbers and farming practices such as fertilizer and slurry application contribute significantly to emissions. However, evidence suggests that technological advances in the areas of food additives, breeding and genetics as well as lowering the age of slaughter can reduce agricultural greenhouse gas emissions by up to 30%.

It was noted that the main impediments to attaining climate goals were lack of financial incentives, the need to maintain food production to combat global food shortages and the slow pace of change in farming practices due to an aging farming cohort.

Introduction

Climate change is one of the most pressing problems facing global populations. A considerable gap exists between climate aspiration and climate action, but national governments are slowly awakening to the severity of this environmental issue. The recent Cop 26 gathering in Glasgow saw much discussion centre upon the immediate need to cut greenhouse gas emissions (GHG's) globally.

This project is relevant as global warming is a real challenge threatening the environment. Ireland is placed on a legally binding path to achieve net-zero emissions by 2050 with the agricultural sector identified as a major contributor and committed to a reduction in emissions of between 21% and 30% by 2030. (Climate Action Bill, 2021) The targets are clear but the means by which to achieve them much less so. This project seeks to examine potential mitigation strategies.

The purpose of the project is to review unbiased academic research relating to beef production in Ireland and to consider the impact farming practices are having on carbon, methane and nitrous oxide emissions, the three most damaging greenhouse gases. The paper evaluates how practices can be altered, modified or even eliminated altogether to enable Ireland to meet its' emissions targets as part of a global 1.5% reduction in greenhouse gases by 2050 as per The Paris Accord (2016). The paper also examines mitigation measures identified in the literature review that can be applied to the Irish context to ensure targets set for 2030 and 2050 are met. The literature reviewed focuses on the sources of emissions in beef production, the farming practices that have contributed to these emissions, the mitigation practices that can be implemented and the barriers to corrective measures.

The project will individually examine the following themes:

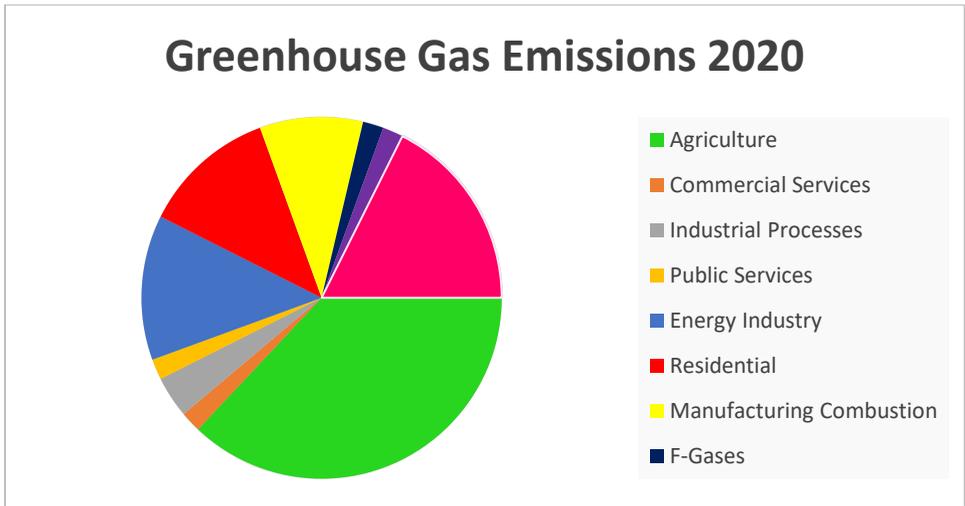
- Livestock numbers and slaughter age
- Fertilizer usage
- Food Additives
- Breeding and Genetics
- Grassland Management
- Afforestation/Hedgerows
- Technologies
- Government Initiatives

The Emissions Problem

Due to global warming, extreme weather patterns are now commonplace and threaten the very existence of some communities. In 1994, Mendelsohn and Nordhaus warned that while climate change was impacting on farming practices, it was a two-way process. As custodians of the land, farmers play a central role in the protection of the environment. There are 110,000 beef farmers operating in Ireland and a further 19,000 people are employed in meat processing. Beef products generated €2.33 billion in exports for Ireland in 2021 and live cattle exports came to €214m (CSO, 2022). The Common Agriculture Policy (CAP) regulates agricultural policy within the European Union, and it could be argued that the EU promoted destructive environmental farming practices for years to ensure supplies of cheap food. However, global emissions are forcing a reversal of that strategy. Pillar 2 of CAP now gives limited discretion to national governments towards measures affecting climate change, particularly emissions of greenhouse gases. A recent study conducted by the Food and Agriculture Organisation of the UN (FAO) (2021) reveals that livestock numbers contribute to 14.5% of GHG emissions globally with 65% of this attributable to bovines, 27% of which are beef cattle.

Figure 1 shows agriculture in Ireland accounted for 37.1% of national emissions in 2020, an increase of 1.6% from 1990. Intensification such as a larger national herd could see this reach 40% by 2030, if left unchecked.

Sectoral Emissions: Figure 1



Impact of Farming Practices

A 500kg beef animal fed on a high concentrate diet produces 230 grams of methane per day. Methane accounts for 30% of the worlds' GHG emissions and 58% of Irish agriculture emissions. (Teagasc, 2020) There are 7.2m cattle in the country. Fertiliser use contributes to nitrous oxide emissions, soil degradation, reduced organic matter and loss of soil carbon. Pesticide use contaminates soil and waterways while reseeding land releases carbon. We must balance these negative environmental impacts against the importance of beef production to the Irish economy and the imperative to maintain global food supplies. A balance must be found between maintaining food production and reducing emissions. (Murphy et

al, 2017, Clarke et al, 2013). Already, food price inflation in the developed countries has trebled since January 2020 due to Covid-19 and political instability. The annual rate now stands at 9.7%.

Figure 2: FOOD PRICE INFLATION CHART

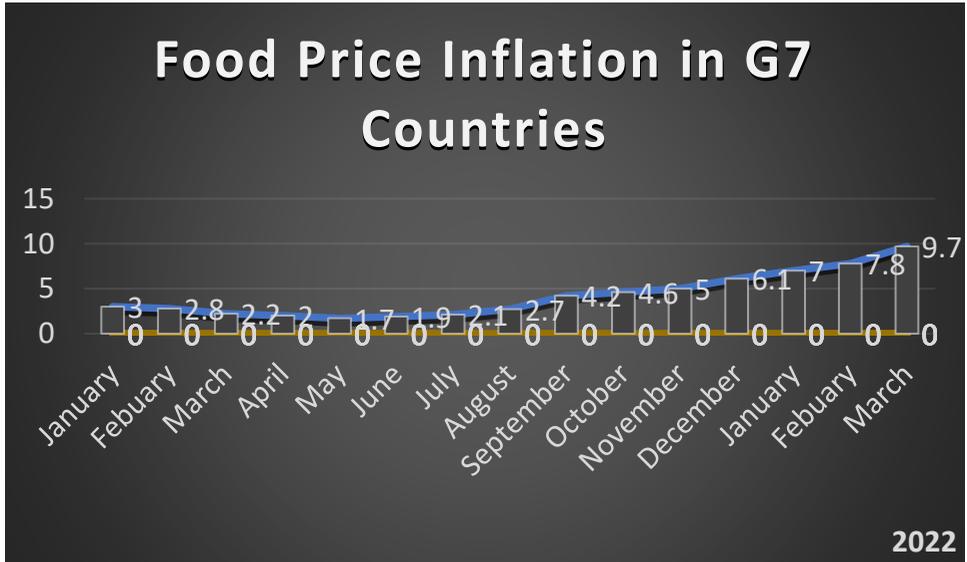


Figure 3: AGRICULTURE GREENHOUSE GASES

GHG	Source	Impact
Nitrous Oxide (N ₂ O)	Derives from chemical fertilizers, slurry spreading, = 12% of Irelands N ₂ O emissions	298 times greater than Carbon over a 100-year span. Damages Ozone layer
Ammonia (NH ₃) *	Comes from the management of animal manures, (housing, storage) grazing animals, synthetic fertilizers, = 98% of Irelands ammonia emissions	Is an air pollutant that volatilizes soils. Acts as a substrate for N ₂ O. Damages ecosystem
Methane (CH ₄)	Comes from enteric fermentation (Rumen in bovines) and manure management = 89%	28 times greater than CO ₂ over 100 years. Contributes to ecosystem damage

	of Irelands CH ₄ emissions	
Carbon (CO ₂)	Results from removing vegetation, disturbing soils, and grassland management. = 12.3% of Irelands CO ₄ emissions	Traps heat in the atmosphere leading to melting ice caps and weather extremes

*Not a GHG but contributes to emissions

Source OECD (2022)

Farming Practices – Review of the Literature

A significant percentage of the research papers examined support the theory that farming practices contribute greatly to GHG emissions. (Lipper et al, 2014, Casey et al, 2006, Lanigan et al, 2015). Some literature takes a different view but has been published on behalf of farming organisations and appears prone to bias. Consequently, to uphold the 'ethical and academic integrity of the project' (Punch, 2016), this literature is not considered applicable to this review with more credence being placed on academic, peer reviewed journals, government publications and university research on agricultural emissions. Most of the literature reviewed is confined to publications since 2005.

Reducing Livestock Numbers

The Climate Action Plan sets carbon and sectoral emissions ceilings for different areas in the economy with agriculture set a reduction target of between 22% and 30% by 2030 which equates to 6m-8m tonnes with further reductions planned thereafter up to 2050. (Greenhouse Gas Working Group, 2019).

The main source of methane emissions in agriculture comes from ruminants. Research suggests this issue must be addressed as it is more effective than carbon sequestration in combatting climate change. (Intergovernmental Panel on Climate Change, 2021). In Ireland, there is a belief that the national herd must be reduced to effect real change. (Lanigan, Donnellan et al, 2019). According to Clune et al, (2008) stocking density should be reduced globally because beef production emits up to nine times the GHG's of other animal products and 50 times more than plant-based foods per unit of protein. This, he suggests, is due to the enteric methane (CH₄) which accounts for 35% of total livestock emissions in carbon dioxide equivalents. Cutting methane emissions by 10% by 2030, as proposed, would require a reduction in the national herd of some 400,000 cattle (Kipling, Styles et al, 2019)

It must be noted however that research by Clarke et al (2013), which focused on finishing beef heifers at 20 months takes a different view. This research reveals that GHG emissions per kilo of beef produced did not in fact increase at higher stocking levels, with only a 4% increase per kilo of carcass using a life cycle approach (LCA) when taking indirect emissions from a reduction in purchased inputs into account. The study concluded that intensification was in fact less harmful environmentally than practices such as diversification which involve high carbon losses to the atmosphere.

Fertiliser Use

Fertiliser use has grown by 11% in Ireland since 2014 (Climate Change Advisory Council, 2021). Production and transportation of chemical fertilizer contributes directly to increased levels of carbon dioxide (CO₂) and nitrous oxide (N₂O). (Geber et al, 2013, Springman et al, 2018). In Ireland, farmers spread chemical fertilizers to replace nutrients lost to the soil. According to Burchill-Kavanagh et al, (2021), 10% to 20% of nitrogen in fertilizers is lost to the atmosphere as ammonia (NH₃), and research agrees that alternatives need to be explored. Clarke et al, 2013, suggests a 10% reduction in application rates of chemical fertilizer can provide a net reduction in emissions of 8% while maintaining stocking rates.

According to Harrison (2001), farmers replacing chemical fertilizers with ammonium nitrate (AN) fertilizer can reduce emissions to <4%. However, research carried out by Crossan (UCD, 2020), suggests this method would actually lead to an increase in emissions of nitrous oxide (N₂O). He suggests the use of slow release protected urea as a means of reducing N₂O emissions by 2 million tonnes by 2025 as it contains 75% less GHG's than nitrogen. Switching from CAN to 100% protected urea has the potential to deliver an 8% reduction in emissions at a spreading rate of 225kg/N per hectare. (Teagasc, Johnstown Castle, 2020) A different perspective is presented by Brentrup, (2008) who suggests that the benefits of chemical fertilizers such as energy balance in grass crops and biomass produced, far outweighs the energy used in production and emissions released into the atmosphere.



There is evidence emerging that nitrogen lost to the soil can be replaced in other ways. The growing of white clover and multispecies swards replenishes nitrogen, boosts mineral levels and also reduces enteric CH₄ methane emissions (Hammond, 2011, Gebremichael, 2021). Advances in technology can also reduce the impact of both chemical and organic fertilizers on the atmosphere. An example is Low Emission Slurry Spreading (LESS) which uses a trailing shoe to inject slurry directly into the soil rather than using the traditional splash back which releases gases into the atmosphere. According to Lanigan et al, 2015, LESS has the potential to reduce GHG's by 168.6kt CO₂ or 36% per year. The use of LESS will be compulsory from 2025 for all farmers above 100 kg livestock N/hectare.

The timing of slurry spreading also impacts emissions with spring spreading advocated over summer spreading, when the activity should be carried out in the cool of the evening (Schahczenski et al, 2009). Acidifying slurry through the use of chemicals can also reduce emissions by 90% as noted in trials for Teagasc (Lanigan, 2022). Another solution is

to increase the amount of land that is organically farmed and fertilizer free from 74,000 hectares to 350,000 hectares, which is 7.7% of all farmland. (Oireachtas Committee on Climate Action, Feb 2022).

Food Additives

Enteric fermentation in ruminant bovines produces CH₄ emissions. If Ireland is to reduce emissions from the current 23m tonnes to between 16-18 tonnes of GHG or 2Mt CO₂-e by 2030, new technologies must be adopted. (Styles, Kipling et al, 2019) One area to be targeted is the composition of the food eaten by livestock. Burchill et al, in association with NUIG examined the composition of GHG's and the mitigating impacts of waste products as 'natural acidifiers'. They noted that ammonia, which is not a GHG, was reduced by between 38% to 67% for sugar beet molasses and grass silage while methane emissions were reduced by up to 70% by brewers' grain and sugar beet molasses. This indicates that beef farmers should consider greater use of food additives. (Gibbons et al, 2019) as they inhibit microorganisms that produce methane in the rumen (Lanigan, 2019).

Food additives can consist of fats and oils such as linseed, synthetic chemicals, nitrate salt licks and natural supplements (tannins and seaweed) and a commercial feed product known as Bovaer. Fats and oils have up to 20 methane reducing capabilities while feeding seaweed at 3% of the diet has been shown to reduce methane by a staggering 80%. (Western Australian Department of Agriculture and Food) This research builds upon a study conducted by Nguyen et al, (2013) which found that a simple alteration such as replacing soya with rapeseed in concentrates reduced emissions by 7%.

According to the recent KPMG Report on Emissions, the proposed initiatives in the Marginal Abatement Cost Curve (MACC) have the potential to reduce emissions by 18% (Lanigan, 2019). One of these initiatives is the use of feed additives such as 3NOP which mitigates enteric emissions by disrupting methane-producing enzymes. Other strategies such as reducing concentrate feedstuffs and shifting to a longer grazing season can produce similar results. (Crossan et al, 2020). MACC proposals are geared towards mitigating close to 2m tonnes of Carbon through improving feed additives and earlier slaughter age. (Farming Independent, Feb 2022).

Reducing Age of Slaughter

The Irish Cattle Breeders Federation (ICBF), Bord Bia and Teagasc recently completed research showing that lifetime carbon emissions can be reduced by over 2 tonnes per livestock unit through reducing the slaughter age by 3 months. This scientific approach can remove one million tonnes of carbon with the potential to achieve 25% of the reduction required of agriculture, based on a CO₂ equivalents model. The method identified is to slaughter spring-born beef off grass at the end of the second grazing season. Currently, only 6% enter the food chain this way. (Teagasc, Grange, 2020). Cattle slaughtered at end of second season only produce 2.9 tonnes of carbon compared to 4.6 tonnes if left until the following season. Slaughter age is important as there is the potential for a 3.9% reduction in GHG for every 30-day reduction in slaughter age, which delivers a 10 to 11% reduction in GHG's. (Bord BIA, 2021).

Recent Teagasc research suggests that focusing on young bull beef rather than steers can reduce emissions by up to 29%. A yearling animal only produces 200g of methane per day and moving from steer to bull beef with slaughter at 19 months, would deliver a massive 29% carbon footprint

reduction. (Crossan, 2021) Beef processors oppose this initiative as they assert that it is more difficult to sell bull beef on European markets.

Breeding/Genetics

It is now possible to breed cattle that produce less methane gas. (Economic Breeding Index, 2001) Scientists estimate that adopting improved genetic breeding has the capacity to reduce the carbon footprint of the beef herd by 11% and the dairy herd by 14% (Gerber et al, 2013). This increased focus on genetics has led to intense research on emissions from different breeds of cattle.

A recent paper from Samonstuen et al, (2020), reveals that emissions are strongly linked to breeding. They suggest that continental cattle such as Charolais and Limousin show greater potential for reducing the intensity of emissions than the traditional British breeds such as Hereford and Angus due to inherent carcass mass. They found that emission intensities were greater for British breeds which was 30.8 of CO₂ eq Kg compared to 29.2 kg CO₂ eq Kg, with enteric CH₄ accounting for 46% of total emissions.

However, more recent scientific research challenges that belief. A collaborative project entitled Rumen Predict currently being conducted by UCD, Teagasc and ICBF suggests some cattle, such as Angus and Hereford can actually be finished earlier due to carcass conformation while producing up to 31% less methane with no loss of growth or carcass weight. Rumen Predict uses a concept called Residual Methane Emissions (RME) which links methane output to feed intake (average animal produces 22g of methane per kg of dry matter consumed). This research assists in identifying low methane producing animals.

The ultimate objective is to uncover the genetic factors associated with RME and use it for a breeding index similar to the Commercial Beef Index (CBI) developed by UCD. Early indications suggest traditional breeds outscore the continental breeds without increased feed intake. This work builds on a much earlier study by Casey and Holden (2006) which compared suckler-bred continental cattle to dairy-bred animals such as Friesian and found that emissions from the dairy breed were 6% less on the exact same diet. This supports the initiative currently being championed by the Food Vision Group encouraging farmers to move to dairy beef production.

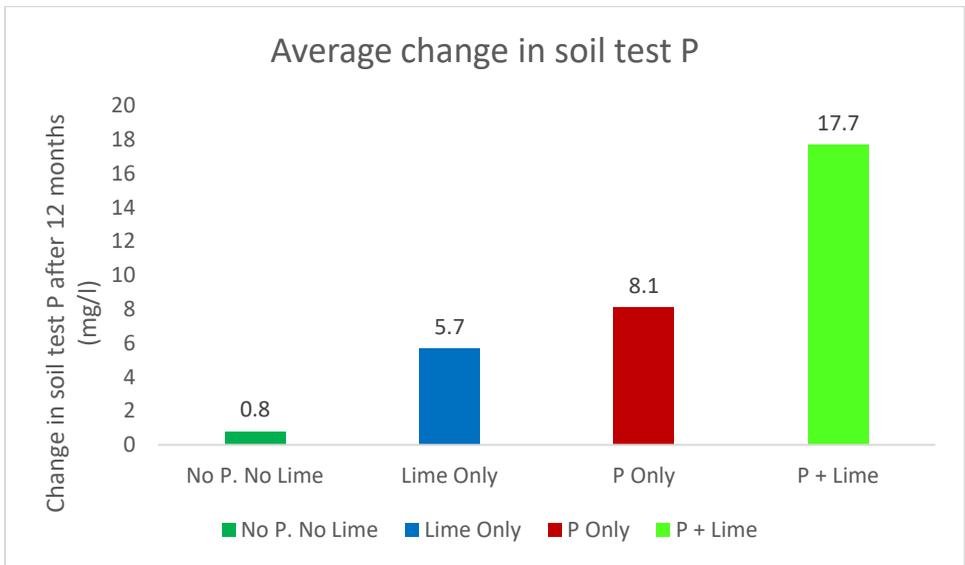
Grassland and Soil Management

Improving the quality of grass available to beef animals reduces methane emissions per kilo of meat. (Boland, UCD, 2022). Researchers advocate adopting multispecies swards including 70% clovers to maintain N levels, leading to reduced use of chemical fertilizers. Rotating grazing to sequester carbon in the soil is also proving environmentally effective (Teagasc, Grange, 2019). According to Lanigan, Donnellan et al (2019), soil is a recognised carbon sink and must be managed to encourage sequestration. They propose the removal of the current carbon sequestration cap beyond the 2.68 Mt CO₂ /n limit and recommend promoting grass management to produce bio methane.

While the research conducted by Lanigan et al actually reveals that grasslands emit more carbon than they sequester (7 tonnes per annum), this is because grasslands are in 2 categories, namely, mineral and peat grasslands. Mineral grasslands sequester half a tonne of Carbon per hectare per year equaling 2m tonnes. However, peat lands emit 9 tonnes of Carbon per year. (Agricultural Science Emissions Webinar, Feb 2022) so the message for beef farmers is to avoid draining, overstocking or poaching peat grasslands. (O'Mara, Teagasc, 2022).

Farmers must also consider the spreading of lime to increase the pH of the soil. The optimum pH levels are >6.2 for mineral soils and 5.5 to 5.8 for peat soils (Duffy, O' Donoghue et al, 2020). Extending the grazing season is also recommended as this reduces GHG emission by 1% for every extra week grazed. (Kipling et al 2019) However, this assertion has been challenged by Boland (UCD School of Ag Science)

Figure 4: Impact of Lime/Potassium on Soil pH



Soil removes 1.2 tonnes of CO₂ per acre per annum with some soils removing more. (Styles, 2021) Ploughing and reseedling disturbs the soil and releases carbon which is stored in the organic matter. While this may be unavoidable at times, tilling can reduce the normal levels of organic matter in the soil (6%) to as low as 4% (Soteriades et al, 2019). Less environmental damage is done if tilling is confined to mineral grasslands. (Duffy, O'Donoghue et al, 2020). There is irrefutable evidence that soil

disturbance from crop rotation can double the levels of nitrous oxide and carbon in the atmosphere (Schahczenski, 2009).

A recent paper from Cusack et al (2021), compared 292 cases of 'improved' farming practices to conventional beef production systems globally. These improved practices included liming, rotational grazing, multispecies grasses and use of riparian margins. The findings suggest that using carbon sequestration on grazed lands can provide potential GHG reductions of 46% per unit of beef and an additional 8% using growth efficiencies. However, this research believes increased consumption of beef will more than offset these reductions.

Afforestation/Rewetting

The Climate Action Advisory Council (CCAC) has set a limit on carbon emissions that require average cuts of 4.8% between 2021 and 2025 and 8.3% from 2026 to 2030. (Climate Action Bill, 2021) Many beef farmers have large tracts of peat lands, woodlands, hedgerows and callow lands which do not support the rearing of livestock, all acting as a carbon sink. However, bogs, woodlands, swamps and hedgerows are not credited to the farmer when calculating the carbon footprint of the farm.

With the exception of Project Woodland, there is no coherent government strategy in relation to woodlands and forestry in Ireland. (Mackinnon, 2021). The provision of licences to plant, thin, and fell trees is painfully slow, resulting in the need to import timber supplies from Scotland. This inaction is prompting some farmers to sell carbon credits to large multinationals such as Google and Apple, who are responsible for large carbon emissions with no responsible consumption of bio-based products. (Verkerk et al, 2022).

According to Styles (UL, 2021), forestry removes .3 tonne of CO₂ per acre per annum. Lanigan et al, (2019), propose that Ireland should aim to plant

20,000 ha of forestry per year. Only 101 farmers planted 81 ha of forest in 2020 because of the difficulty with permits. There were 6,283 ha planted in 2012. Only 12% of the permits issued in 2021 were for planting trees but the government plans to issue 5,250 forestry licences in 2022 (DAFM, 2022).

Encouraging and supporting beef farmers to preserve hedgerows are of equal importance. Hedgerows store carbon in the woody biomass, leaves, roots and surrounding soils. Hedges have the potential to store between half a tonne and 3.3 tonnes of CO₂ per ha per year (Styles, 2021) and sequester one tonne of CO₂ per kilometre (Teagasc, 2020). Farmers can play their part by refraining from cutting hedges during the nesting season and burning the bushes afterwards as required under The Waste Management (Prohibition of Waste Disposal by Burning) Regulations, 2009.

According to Teagasc, peatlands hold twice as much carbon as forestry. The improved management, conservation and restoration of peatlands and wetlands are effective ways to reduce emissions. (IPCC, 2021) For farmers, this involves ceasing the extraction of turf and conserving marshy tracts of land by excluding livestock during the winter months. It especially means refraining from planting trees on peatlands as this practice actually produces GHG's rather than the peat acting as a carbon sink. (Daly, UCC, 2018).

Adopting Technologies

Agriculture contributes one third of Ireland's GHG emissions. Reducing cattle numbers alone will not ensure targets are met so technology will play a big part in the control of emissions. In addition to the technologies already referenced, other technologies can play an important role. Work by scientists is progressing in New Zealand on a vaccine that will trigger

an animal's immune system into generating antibodies in saliva that suppress the growth and function of methane-producing microbes in the rumen. (Clarke, New Zealand Agriculture Greenhouse Gas Research Centre, 2021) It may be 10 years before the vaccine becomes commercially available.

In the meantime, other technologies are being developed. These include reducing beef emissions by up to 24% by devising ways to produce biomethane from food and animal waste and feeding it into the national network. (Devenish/KPMG, 2021) Sexed semen which reduces bull calf births also contributes to emission reduction as it targets beef bulls to service the beef herd and the Commercial Beef Index (UCD) can be utilised to choose best performing breeds to rear while the Teagasc Signposts Programme provides a scientific roadmap to sustainable and climate-friendly farming.

A new initiative is the Advantage Beef Programme (ABP) which is an integrated supply chain programme done in conjunction with processors which signposts the most advantageous age to slaughter beef from a productivity and environmental point of view.

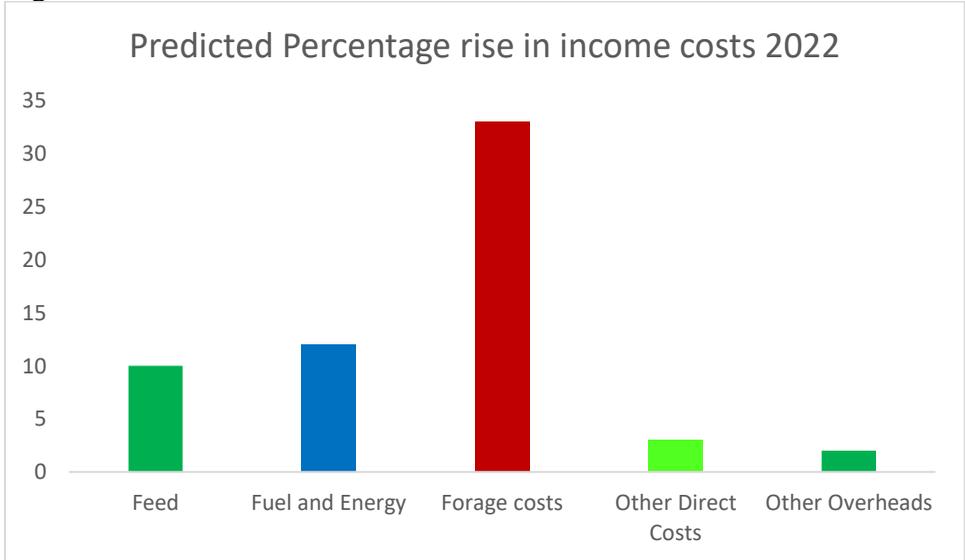
EU and Government Initiatives

The Irish Government in collaboration with the European Union is committed to pursuing a net zero emissions target under the Common Agriculture Policy and the Climate Action Plan (2021). The initial target is a 51% reduction for all sectors combined by 2030. The cost of the Plan is estimated at €125bn. (Irish Times, Nov 2021).

In relation to agriculture and the production of beef, these initiatives include:

- Farmers generating their own electricity through renewable sources e.g., placing solar panels on shed roofs
- A new CAP introduced with 25% of funding devoted to environmental protection
- Strict rules in relation to farming practices
- Bord Bia Quality Assurance extension
- Farmers engaging in environmental schemes such as GLAS to protect waterways
- Extending organic farming to 350,000ha by 2030
- Promoting the use of farm waste for biomethane to power 300,000 homes by 2030
- Supporting clustered farmers to make green hydrogen (hydrogen + water) to replace oil/gas as energy, which is their greatest expense after forage (see Figure 5)

Figure 5:



Conclusion/Summary

Irish agriculture is the single largest contributor to Ireland's GHG emissions at 37.1% of national total. The sector has often been unfairly pilloried due to isolated runoffs from farmland into waterways affecting fish, molluscs and vascular plants thus attracting bad press. On the plus side, agriculture accounts for 7% of all economic activity, employs approximately 165,000 people and produces 10% of all exports, worth €14bn annually. (Irish Times, Nov, 2021).

Ireland has a good reputation internationally as cattle are mainly grass-fed and spend a lot of the year outdoors. Farmers are not oblivious to the problem of emissions and are willing to contribute to emissions mitigation. Already, farmers are engaging in many of the improved practices outlined in this paper aimed towards reducing levels of GHG's. Farmers' willingness to engage in improved mitigation measures is evident based on responses to my survey. (Appendix 1)

There is a strong belief in Ireland and in Europe that stabilizing the national herd and improving beef genetics and feeding while working positively on the other areas highlighted in this project can reverse trends. Despite the advances made, the Environmental Protection Agency (EPA) remain concerned with Ireland's recent figures which show only a 1.4% reduction in emissions in 2020. (Irish Times, Oct 22nd, 2021). This limited progress may be related to barriers such as resistance to change, the need to maintain food production (Springmann, 2018) and preserving the viability of the family farm.

The key to combatting emissions lies in empowering and supporting the true custodian of the environment, the farmer. Farmers must not be continuously held accountable for negative climate figures, many of which can equally be attributed to non-agricultural sectors. Instead, governments

must work with farmers, offer financial inducements and engage in compromise, so that solutions can be progressed. Otherwise, the survival of the planet is at stake and society cannot afford the price of failure.

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An Investigation of the factors that contribute to the development of Entrepreneurship: The influence of genetics and the environment on entrepreneurial intention

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Abstract

This project examines the factors that influence the development of entrepreneurship. The study explores both the genetic factors and the environmental factors that contribute to entrepreneurial intention. The main aim of this research is to discuss whether the development of entrepreneurial intention is influenced more by genetic factors or by environmental factors. This research is important because the literature on entrepreneurship has the perspective that entrepreneurial intention is influenced entirely on genetics or the environment. Essentially the literature creates a black or white scenario meaning that entrepreneurs are either born or made. The methodology used for this project is literature analysis. The main findings of this research are that entrepreneurial intention is influenced by a combination of both genetic and environmental factors. The genetic factors that have influenced entrepreneurial intention the most is personality, characteristics, and physiological factors. For personality (using the Big Five Model, also known as the OCEAN model), individuals who scored higher in openness to experience, conscientiousness, extraversion and scored lower in neuroticism were

more likely than others to become entrepreneurs. The six characteristics that influence entrepreneurial intention are: the need for achievement, self-efficacy, innovation, stress tolerance, internal locus of control, and proactiveness. For physiological factors, individuals who have high levels of testosterone, adrenaline, and low levels of cortisol have been found to be more likely to be entrepreneurs. The environmental factors that influenced entrepreneurial intention the most is mentoring/networking, college education, deliberate practice, and growing up in a family business. Mentors help individuals to learn entrepreneurship from someone who has some experience while a college education gives individuals the opportunity to create a network of like-minded people. Deliberate practice influences entrepreneurial intention because the individual learns the habit of continuous improvement. Meanwhile, someone who grows up in a family business increases their entrepreneurial intention by 30%.

Keywords: Entrepreneurship, entrepreneurial intention, genetics, environmental factors, self-efficacy, deliberate practice.

Introduction

The research that the writer will carry out is the area of entrepreneurship. My research question is: are entrepreneurs born or made? The aim of this research is to investigate whether entrepreneurship is determined by personality (born factor) or the environment they grew up in (self-developed factors). This research will focus on the key factors of both sides of genes versus environment debate. The objective of this research is to:

- Examine the influence that genetics has towards entrepreneurial intention.
- Explore how the environment contributes to entrepreneurial intention.
- Discuss why do people engage in entrepreneurial activity.

The word “entrepreneur” comes from French which means undertaker i.e., to undertake a new venture, coined by Jean-Baptiste Say (Beattie, 2021). An entrepreneur can be defined as a person who is willing to and able to convert a new idea or invention into a successful invention (Schumpeter, 1934). Entrepreneurship can further be defined as the pursuit of a discontinuous opportunity involving the creation of an organisation or sub-organisation with the expectation of value creation to the participants (Carton, Hofer, and Meeks, 2004). Therefore, an entrepreneur is someone who identifies an opportunity, gathers the necessary resources, creates and is ultimately responsible for the consequences of the organisation (Carton, et al., 2004). Entrepreneurship can also be defined as the process of extracting profits from new, unique, and valuable combinations of resources in an uncertain and ambiguous environment (Drucker, 1985). Therefore, entrepreneurship is really about an individual taking the initiative to start something new or different.

In this research the term Entrepreneurial Intention is used and has been defined as the growing conscious state of mind that a person desires to start a new enterprise or create a new core value in existing organisation (Remeikiene, Startiene, and Dumciuviene, 2013). The main purpose of this research is to explore entrepreneurship: the influence of genetic make-up and/or the environment in which one is brought up on their development as an entrepreneur. One of the reasons why this research is important is because entrepreneurs create new businesses which involve identifying and pursuing new opportunities. To pursue these opportunities, entrepreneurs create new jobs to develop innovative products and services which helps grow the economy. According to the Global Entrepreneurship Monitor (GEM), 79% of Irish entrepreneurs expect to be employers in the early stages of their start-up (Fitzsimons & O'Gorman, 2020). Also, Enterprise Ireland announced that 11,911 new jobs were created in 2021 from new ventures, which is the highest single net increase of jobs in a single year (Enterprise Ireland, 2022). This demonstrates the impact entrepreneurs have in creating employment for other people as they help them to earn an income.

Another reason why this research is important is because, arguably, entrepreneurship promotes community development. Entrepreneurs don't only create businesses; they also create social organisations. For example, many entrepreneurs engage in philanthropic practices by donating much of their wealth to charity. According to a report by Fidelity Charitable 43% of entrepreneurs plan to give up their wealth to charities when they die (Fidelity Charitable, 2018). For example, Andrew Carnegie donated a much of his wealth to help build over 2,500 libraries all over the world as well as several universities. It is estimated that Carnegie donated over \$350 million throughout his life (Carnegie Corporation of New York, 2015). An Irish example would be Tony Ryan who donated over €95 million in his will to fund for advanced education, religious services and relief of poverty (Deegan, 2017). After his death, the Tony Ryan Trust was incorporated in

2009 to continue the charitable work of Tony Ryan including donations of €2.52 million to DCU and €250,000 to NUI Galway.

Literature Review

From reading the literature on entrepreneurship, one could argue that there is a constant discussion amongst individuals in the business world about what is the dominant influence on a person's decision to become a successful entrepreneur. There is an ongoing debate about what factors determine who will become an entrepreneur: genetics or the environment (Mitchell, 2016). Fisher and Koch, (2008) believe that entrepreneurs are born because of their genetic material and how it influences factors such as personality, memory, focus, perception, problem solving abilities and creativity. Therefore, their focus is on the Characteristics which are evident from birth: innate characteristics of an entrepreneur. In contrast, Kumari, (2018) and Mitchell, (2016) believe that entrepreneurs are created by the environment and are influenced by their surroundings. Thus, they are products of their environment e.g., exposure to education, mentors, child of a family business owner. Therefore, their focus is on how the environment influences a person's behaviour in deciding to build a business.

Characteristics theory (born entrepreneur stream).

Kerr, Kerr, and Xu, (2017) who have researched the influence of genetics on entrepreneurship argue that one of the biggest determinants of entrepreneurial intention is personality. One approach that has been used (and has influenced the growth of psychometric tests in the area of personality characteristics and traits) is the work of McCrea and Costa. According to McCrea and Costa (1983) the Big-5 Model is a method used to measure an individual's personality by analysing 5 broad characteristics. These characteristics are Openness to Experience,

Conscientiousness, Extraversion, Agreeableness and Neuroticism. These characteristics are shortened to the acronym OCEAN. McCrea and Costa argued that each of these characteristics can be measured on a spectrum with one end of the spectrum being perceived as a positive side of the characteristic and the other as negative. For example, if a person scores low in neuroticism it means that the person is calm, which can be perceived by others as a positive thing. Whereas if someone is high in neuroticism they are perceived as being prone to stress and anxiety, which people may consider to be negative factor. The same is true for the other characteristics as each one has a positive and negative dimension. In the study by Kerr, et al., (2017) they found that entrepreneurs were rated higher than fellow employees when it came to Openness to Experience. This means that entrepreneurs are more likely to thrive in situations that involve new challenges in comparison to fellow employees who, arguably, prefer stable and predictable environments. In the world of business this can be seen in times of crisis. For example, 68% of entrepreneurs adapted to the Covid-19 pandemic by making changes to their business plan (Klausen, Perez-Luno, Stephan, and Zbierowski, 2021). For example, Pádraig Fahy pivoted his fruit and veg business to go online during lockdown. Since then, demand for his business quadrupled (Kennedy, 2020). Conversely, managers who prefer a stable environment found it harder to adapt because they view a challenge as a problem, while the entrepreneur views it as an opportunity to adapt and to improve the business. For example, the researcher met a manager of an energy company and he said that it has been difficult to adapt to the pandemic because the staff are working from home which makes it harder to communicate with the team. As a result, he said productivity has decreased because of the challenges of communication on remote working. One reason for this could be down to the fact that a manager doesn't have the same influence as the entrepreneur when making strategic decisions such as adapting to the pandemic since the entrepreneur owns the business.

According to Zhao & Seibert(2006), entrepreneurs score higher in conscientiousness (McCrea and Costa, 1983) than those who are not entrepreneurs. Conscientiousness is about a person's motivation for achievement as well as their ability to take on responsibility. This can be seen in career paths such as entrepreneurship because entrepreneurs take on all of the financial responsibility of the business if it fails. What is interesting about Zhao & Seibert (2006), findings is that managers and entrepreneurs were very similar when it came to responsibility, however, entrepreneurs scored higher when it came to achievement motivation. Thus, entrepreneurs are more goal-oriented than their peers. For example, entrepreneurs such as Elon Musk have been reported to work 80 to 100 hours a week (Johnson, 2018). Whereas it can be argued that the "average" business manager works 48 hours a week (Workplace Relations Commission, 2018). Therefore, this suggests that entrepreneurs work longer than managers despite have similar responsibilities. However, conscientiousness on its own does not dictate the number of hours an entrepreneur works. Other factors such as a person's tolerance towards stress should also be considered when comparing the conscientiousness of entrepreneurs and managers. For example, entrepreneurs don't see a problem as stressful; rather they view it a challenge to improve i.e., Thomas Edison has failed over 10,000 before successfully finding way create a light bulb (Daum, 2016). Another important point (McCrea and Costa, 1983) to mention is that conscientiousness has both a positive and negative dimension just like the other characteristics in the Big Five Personality Model. In this case someone who scores high in conscientiousness is generally hard working and this is commonly perceived as something positive. Likewise, a low scored indicates someone who is lazy and is perceived negatively. However, if someone scores very high in conscientiousness it can, potentially, become destructive to one's health as there is a limit to how hard a person can work i.e., burnout caused by overwork. Therefore, it is reasonable to comment that individuals who have a higher score in conscientiousness than

average, but not so high that they work endlessly and end up being burnt out, are the people who could be potential entrepreneurs.

When it comes to extraversion it is argued that entrepreneurs are more likely to be extraverts than introverts. Extraversion is defined by the orientation of one's interests and energies toward the outer world of people and things rather than the inner world of subjective experience (American Psychology Association, 2022). In essence, individuals who are extraverts are usually out-going, gregarious and sociable. Kerr, et al., (2017) make the claim that extraversion is important for success in entrepreneurship because entrepreneurs must act as salespeople to sell their idea to investors and partners. As a result, extroverts may be drawn towards becoming entrepreneurs because they enjoy meeting people, which is necessary in the area of sales and marketing. However, this does not mean that introverts can't be entrepreneurs, but it suggests that entrepreneurship comes more naturally to those who are extraverted. Zhao & Seibert (2006) argue that there is no significant difference between entrepreneurs and non-entrepreneurs when it comes to extraversion. They argue that extraversion is not as important as one might assume because extraversion is a spectrum, which indicates that it is not all or nothing. For example, an introvert can be sociable when they want to, but may prefer less sociable occasions. This could explain how introverts such as Larry Page and Mark Zuckerberg became successful entrepreneurs (Entrepreneur Europe, 2017). While they may prefer to work alone, they know that they have to work with a team because they have to in order to have a successful career. Overall, when it comes to extraversion more research is needed to make a more definitive explanation on the effect of extraversion on entrepreneurship.

When it comes to risk taking Fisher & Koch, (2008) argue that extraversion plays an important role. This may be because entrepreneurs may react differently from other individuals to external stimuli that would

be perceived as risky or dangerous. For example, Travis Kalanick dropped out of college to start up a multimedia search engine called Scour Inc. Within two years the company became bankrupt. Kalanick ended failing two more business before founding Uber (Olson, 2016). However, in contrast to Zhao and Seibert's findings (2006), Fisher and Koch (2008) say that extraversion plays a big role in the personality of entrepreneurs. Arguably the reason for this is because extraverts are more likely to take risks as they are motivated to succeed and are driven by results. It is also argued that those who are introverted are less likely to act entrepreneurially in relation to risk-taking because introverts react quickly to the lower levels of stimuli than extraverts do (McCrea and Costa, 1985). Conversely, extraverts have an under stimulated mind where they become more energetic when there is a lot of external stimuli. This is because extraverts are less sensitive to dopamine than introverts (Salumbre, 2019). Dopamine is a neurotransmitter or chemical that carries messages between the brain cells and to other cells in the body. Dopamine acts as a reward system to the brain that causes an immediate feeling of euphoria or happiness. This could suggest why extraverts are more likely to take risks and therefore act more entrepreneurially since extraverts are less sensitive to dopamine. Similarly, there is little definitive support for the notion that there are any substantial differences in agreeableness and neuroticism. However, Zhao & Seibert, (2006) say that entrepreneurs score less in neuroticism than employees which could explain their confidence when starting a business.

According to Frese & Rauch (2007) there are six personality characteristics that entrepreneurs need to have to be successful. These characteristics are: the need for achievement, self-efficacy, innovativeness, stress tolerance, a proactive personality, and a need for autonomy and locus of control. Self-efficacy is a person's belief in their ability to succeed in a particular situation (Cherry & Morin, 2020). Psychologist Albert Bandura described these beliefs as determinants of how people think, behave, and feel. Bandura argues that self-efficacy can

impact on multiple areas on a person's life from psychological states to behaviour to motivation (Bandura, 1977). Essentially, self-efficacy determines what goals an individual chooses to pursue, how they go about achieving those goals and how people reflect upon their performance. One can suggest that people who are self-efficient are more likely to succeed because it is their belief in their ability to achieve the goals they have set for themselves. This is what motivates them to keep going until they reach the desired outcome. Innovativeness is the degree which an individual is relatively earlier in adopting an innovation than other members (Rogers & Shoemaker, 1971). Stress tolerance is defined as the capacity to withstand pressures and strains and the consequent ability to function effectively and with minimal anxiety under conditions of stress (American Psychology Association, 2022). A proactive personality means that the individual takes the initiative to try new things. The need for autonomy and internal locus of control means that these people want to be their own boss rather than having someone tell them what to do. Rauch & Frese (2007) report that these six characteristics have a positive correlation to both new venture creation and long-term business success. Bandura, (1977) also found that these traits can give an accurate prediction for entrepreneurial behaviour. This is because these traits are closely matched to the tasks of entrepreneurs. For example, traits such as the need for achievement has a stronger correlation to entrepreneurship than traits not listed by Rauch and Frese. However, just because a person may have these traits (such as the need for achievement and a proactiveness) does not mean that they will definitely be an entrepreneur in the future, but it just indicates that the person is more likely than those who don't have the traits. Likewise, there are people who may not have these traits yet may still become an entrepreneur because of other factors such as high intelligence. Viinikainen, Heineck, Bockerman, Hintsanen, Raitakari, and Pehkonen (2016) argue other characteristics or traits should be included. According to Viinikainen, et al., (2016) they say that characteristics such as aggression, leadership, responsibility, and eagerness-energy should also

be recognised as entrepreneurial personality traits. These traits are also known Type A behaviour traits. However, despite this, leadership was found to be the only trait that had a significant correlation with business success. This is because leadership demonstrates the individual's desire to win or to take charge. However, unlike the traits mentioned by Rauch & Frese, (2007) Type A behaviour types are only partially genetic meaning that other variables such as exposure to experience (i.e., entrepreneurial experience as a child) play role in determining who has these characteristics. It is clear that this is an area that requires further research.

Nicolaou, Scott, Cherkas, and Atkins (2008) who support the characteristics trait theory also believe that genetics play a role in entrepreneurial intention. They carried out research that examined the genes of both identical and non-identical twins in order to analyse if these genes contributed to the development entrepreneurial talent. They found that genetic factors have significant influence on individual's tendency to become an entrepreneur. For example, Patrick and John Collison are two brothers who founded Stripe (Bradsaw, 2021). One could argue that the Collison brothers are an example of genetics playing role in entrepreneurship since they are from the same family and pursued the same interest with a strong enthusiasm. However, environmental factors should also be appreciated as the brothers may have been competitive in order to push them to improve their business. Furthermore, the study carried out by Nicolaou, et al., (2008) did highlight some of its own limitations. For example, even though genetic factors influence the tendency to engage in entrepreneurial behaviour it does not mean that entrepreneurship is ultimately determined by genes. This is because the researchers couldn't identify which specific genes had the most influence on entrepreneurial characteristics traits. Therefore, genes play a role but to what degree they determine entrepreneurial activity is debatable and is open to further investigation. However, in contrast, Goren & Krammer (2021) argue that there is a gene that could be linked to the tendency of entrepreneurial

engagement. They said that individuals that have a greater frequency of the 2- and 7-repeat allele variants of the DRD4 exon III gene are more likely to be entrepreneurs. This is because this gene is linked to risk-taking behaviours. For example, Patrick Dudley-Williams had to take a massive risk to start his business Reef Knots. This is because he was made redundant from his job leaving him to use all of his personal savings including his redundancy package. Another example is Suzanne Brock who remortgaged her home to fund her factory because the bank refused to give her loan (Donnelly, 2021). These are two examples of entrepreneurs who took big risks to start their business. One could argue that they could potentially have the DRD4 exon III gene because of the risks they took. However, this could also be down to the environmental circumstances they found themselves in for example, they took risks out of necessity (losing a job and not having the available funds).

Patel, Rietveld and Verheul (2019) found that there is a link between entrepreneurship and ADHD (Attention Deficit Hyperactivity Disorder). The authors argued that individuals who are diagnosed as ADHD have a tendency to become self-employed and that there is a positive link between ADHD and starting a business. Yu, Wiklund, and Perez-Luno (2019) write that ADHD enhances business performance because their hyperactivity allows these individuals to be innovative and creative. However, there is still a debate whether ADHD enhances or hinders an entrepreneurs performance. This is because part of the diagnosis of ADHD is deficiencies in concentration as well as having high levels of energy. Arguably, this would make following a routine and instruction difficult. Despite this there are numerous examples of entrepreneurs such as Ingar Kamprad, Richard Branson, and David Neelman who have said that their ADHD has allowed them to be successful business owners (Dimov, 2017). This suggests that sometimes a disadvantage such as ADHD can actually be a strength because it forces people to be more resilient and to focus on their strengths like being creative. It could also be down to the fact that

ADHD is linked to their determination and energy because of hyperactivity. And if this energy is used creatively, then they can develop the skills of an entrepreneur.

White, Thornhill, and Hampson (2006) have also found that there are other physiological factors that influence entrepreneurial engagement, not just psychological or genetic factors. The authors argue that individuals who have higher levels of testosterone are more likely to engage in entrepreneurial behaviour. One reason for this is because testosterone influences people's tendency to take more risks (Bonte, Procher and Urbig, 2016). Testosterone also helps with the person's concentration and energy levels as well as their memory, which allows them to be more productive. However other hormones such as cortisol and epinephrine (adrenaline) also influence entrepreneurship. Individuals who have higher levels of epinephrine and low levels of cortisol have arguably been found to be more entrepreneurial (Patel & Wolfe, 2017). For example, entrepreneurs such as Angus Imlach are "adrenaline junkies" since they take part in several extreme sports such as snowboarding, cliff diving and kayaking (Coleman, 2020). Imlach believes that this adrenaline has allowed him to be successful in business. This is because adrenaline has a number of benefits such as increased focus, and memory (McGaugh, 2013). Therefore, it can improve the individual's overall performance in business in combination with low levels of cortisol as allows individuals to make tough decisions without being affected too much by stress.

Another factor that could explain why entrepreneurship is linked to genetics is the influence of family business exposure. Arguably, children who were born to entrepreneurial parents were more likely to engage in entrepreneurial behaviour themselves according to Carr & Sequeira, (2006). This is because their parents have certain genes and characteristics that are inherited by the child and thus increases entrepreneurial intention. For example, many successful businesses such as Walmart and Nike are

family businesses. As a result, 48% of entrepreneurs grew up in a family business (O'Keefe, 2016). This suggests that the role of family role models plays a big part in a child's decision to pursue a business. However, being exposed to an entrepreneur is part of the environment since entrepreneurship is part of the child's family life. As a result, the child considers entrepreneurial behaviour as the norm since they see their parents practise it every day. Arguably it is important for a child to learn and develop characteristics such as stress tolerance Rauch & Frese, (2007) and self-efficacy Bandura, (1977) if parents plan to have their child to be the successor of the family business. This is because entrepreneurship is a demanding career where one must manage their stress levels when dealing with their responsibilities. For example, the owner of a business is responsible for the wellbeing of their staff as well as satisfying the demands of the company's investors. Arguably by developing a high stress tolerance, the child will grow up to be resilient and will be able to perform the best they possibly can without suffering the negative effects of stress. This can be also linked to personality as these individuals could possibly be low in neuroticism in the Big Five Personality Model (McCrea & Costa, 1985). As mentioned early low scores in neuroticism indicates that the person tends to be calm and has composure when dealing with difficult problems. Therefore, one can argue that entrepreneurial children born in a family business are a combination of both genes and environment because they have been exposed to experience their parents' behaviour as well as inheriting certain characteristics such as self-efficacy. Overall, the genetic influences on entrepreneurship are personality, innate or biological characteristics or personal motives e.g., need for achievement or locus of control etc. and physiological factors. Having discussed the genetic influences on entrepreneurship the next section will focus on the second objective of the research: the environmental factors that influence entrepreneurial intention.

Environmental Influences (Made entrepreneurs stream)

The environmental influences that will be discussed in this section are deliberate practice, mentorship, college education, epigenetics, and the family environment. These factors are considered because it will demonstrate that entrepreneurship is not just about the genetic factors and to give a balanced perspective on what factors influence entrepreneurial intention.

Environmental influences in entrepreneurship means that there are factors that influence an individual's ability to become an entrepreneur by learning and developing certain skills. Kumari, (2018) and Mitchell (2016) who support this theory believe that entrepreneurs are made rather than born. One of the reasons for this is because of the study of epigenetics. Epigenetics is the study of how our behaviours and environment can cause changes that affect the way your genes work (CDC, 2020). However, this process can take time, even over generations of interaction between the genes and the environment. Unlike genetic changes, epigenetic changes are reversible and do not change your DNA sequence, but they can change how your body reads a DNA sequence (CDC, 2020). Thus, someone might have a specific gene but because the person lives in a particular environment and adopts certain behaviours that gene isn't expressed. For example, someone could have a gene that is linked to heart disease but may not get it because the person changes their environment to allow them to live a healthy lifestyle. Another example is that someone may have a musical innate ability but because they are in an environment that doesn't support musical endeavour the person may not become a musician. Likewise, an individual who has certain entrepreneurial characteristics won't necessarily become an entrepreneur because they need to adopt a certain lifestyle and live in an environment that promotes entrepreneurship. According to Acs & Lappi (2021) there is a positive relationship between epigenetics and entrepreneurship. This is because a

country's culture may well influence a person's decision to start a business. For example, the United States is ranked the most entrepreneurial country in the world because it is the home for Silicon Valley where the world's biggest Tech companies started including Apple, Facebook, and Google (Dimitropoulou, 2021). The American culture promotes entrepreneurial endeavours because the government offers businesses grants for their creating innovative products and services e.g., the Small Business Innovation Research Program (Small Business Administration, 2022). However, it is worth noting that epigenetics is an evolutionary process which means that it takes a couple of generations for genes to adapt to its environment. Therefore, this could explain the importance of the culture of the country a person grew up in as a culture develops over generations. For example, China is a communist country where the government monitors and directs business trade. This could be because China has a conformist culture meaning that there are few opportunities for individuals to succeed outside the "norm" or what the authorities state are acceptable. For example, it is argued that such a culture encourages everyone to have the same morals and values and that they should not question their government. As a result, China is ranked 78th in Entrepreneurship (Wall Street Journal, 2022). However, when individuals from countries such as China move to a country such as America, they are more likely to start a business as there are more opportunities available to them. For example, 20.2% of American entrepreneurs are immigrants (Xavier, et al., 2012). In 2015, Asian-American entrepreneurs generated over \$652 billion in America as well as creating over 4 million jobs (Kostan, 2018). Therefore, one can suggest that the culture of a country and the context in which one grows up can influence a person in deciding to start a business.

Ericsson, Krampe, & Tesch-Romer (1993) who take the view that entrepreneurs are made also believe that deliberate practice plays an important role in determining entrepreneurial success. Deliberate practice

can be defined as the activities that are specifically designed to improve the current level of performance. Thus, entrepreneurs who deliberately create the habit of continuously learning and improving themselves and their skills are more likely to be successful. Deliberate practice involves effortful and goal-oriented practice activities that an individual specifically designs to improve performance in a particular skill. For example, Elon Musk taught himself how to build rockets by reading books and Warren Buffett taught himself how to invest by reading 500 pages a day (Wu, 2021). Deliberate practice also includes having a positive relationship with role models who can also help them to learn specific behaviours, which will then enhance their chances of becoming a successful entrepreneur. Thus, in business this can be observed as an entrepreneur taking classes or spending extra time in training after work to sharpen their skills to gain a competitive advantage. According to Keith, et al., (2015) there is a positive relationship between deliberate practice and entrepreneurship. This suggest that Malcolm Gladwell's theory of "10,000 hours" of practice in his book "Outliers" could be accurate, since people have the ability to learn skills that contribute to entrepreneurial success. However, psychologist Anders Ericsson partially disagrees with Gladwell's 10,000 hours claim because it depends on the quality of work in those hours that matter (De Luce, 2019). Despite this, entrepreneur Michael Simmons did research on successful entrepreneurs engaging in deliberate practice (Tank, 2019). Simmons found that many of them including Oprah Winfrey and Warren Buffett set aside 5 hours a week dedicated to learning. This was a common pattern among top business leaders which Simmons coined the term "The Five-Hour Rule".

Another environmental factor that may influence entrepreneurial intention is college education. A study conducted by Zhou, et al., (2021) found that students who go to university are more likely to take modules or classes in entrepreneurship. They also found that college education in general increases entrepreneurial intentions in China. This is also accurate globally

according to Hill, et al., (2022) at the Global Entrepreneurship Monitor. They found that graduates were more likely to start their own business than non-graduates in the 36 of the 47 countries in the study. Four of these countries are all in Europe (Spain, France, Italy and Luxembourg). However, there are exceptions to the influence of college education on entrepreneurial intention as there are numerous examples of people becoming successful entrepreneurs without a college degree. For example, Ray Croc, founder of McDonalds and Larry Ellison, founder of Oracle both became successful entrepreneurs despite not having a college degree (Toren, 2011). Therefore, the suggestion that possessing a degree to become successful as an entrepreneur needs more research. One possible explanation is that one could argue that a person's success is determined by their motivation and eagerness to learn. For example, some individuals choose not to go to college because they are more motivated to learn by getting some work experience in the industry in which they wish to start their own business. This could result in an apprenticeship where the aspiring entrepreneur follows and imitates an experienced entrepreneur to learn how to start and run a business. An example would be Austin Boop from Pennsylvania, United States. When he was in secondary school, he was unmotivated and didn't want to go to college despite of his parents and teachers telling him to do so. Instead Boop started an electrician apprenticeship when he was 17. Four years later he started his own electrical business called YoCo Electric (Perna, 2020). This is an example where someone was more motivated to go into entrepreneurship by first doing an apprenticeship rather than undertaking a college degree.

Having an entrepreneurial parent is also an environmental factor as they can act as a role model, whether this influence is conscious or unconscious on the part of the child. According to Andersson and Hammarstedt (2010 and 2011), Arum and Mueller (2004); Colombier and Masplet (2008); Dunn and Holtz-Eakin (2000); Sorensen (2007); the probability that a child will become an entrepreneur increases by 30%-200% if they have a

parent who is self-employed. Arguably the reason for this is because the child would grow up watching and observing the behaviours of their entrepreneurial parents and may see that the use of such skills for example financial skills can lead to success. Lindquist, Sol, and Van Praag (2015) conducted a study to compare the difference between the influence of biological parents and adoptive parents had on a child's entrepreneurial intent. They found that children who grew up with adoptive parents were twice as likely than those of biological parents to be an entrepreneur. Interestingly a reason for this could be down to the influence that a child's unconscious mind on their behaviour meaning that childhood experiences can have an impact on a child's decision making. According to Harvard Professor Emeritus Gerald Zaltman, (2003) 95% of human behaviour is controlled by the subconscious mind. Arguably, this is related to Freud's notion of innate drives, which trigger motivation in the individual. Note is a view that is mainly driven by psychoanalysis and that a lot of our behaviour is not reflected on or made conscious. However, some researchers such as Lipton, (2005) claim that the unconscious mind is formed in the first 7 years of childhood. This is because children mostly learn through observation. For example, a child learns from their parents by watching the parents' actions and adopting their beliefs. This can help explain why entrepreneurial parents have kids who also grow up to be entrepreneurs because they are used to seeing them perform entrepreneurial tasks and they grew up with a positive mindset. This may be why some family businesses such as Walmart has been successful as the next generation adopted the habits and behaviours of their parents to keep the business running. However, remember that this view stems from psychoanalysis which is heavily criticised because it relies too much on ambiguous data.

Another environmental factor that can influence an individual's entrepreneurial intention is mentoring (Meoli, et al., 2019). Mentorship is the relationship between two people where the individual with more

experience, knowledge and connections (i.e., the mentor), is able to pass along what they have learnt to a more junior individual (i.e., the mentee), within a certain field (Oshinkale, 2019). Mentoring should not be confused with coaching. While the job of both a mentor and a coach is to help the student to increase their skills the main difference between mentoring and coaching is that a coach is paid whereas a mentor isn't (Audet and Couteret, 2012). However, it is important to note this isn't always the case as there are times where the mentor and the coach is the same person. With the help of a mentor an individual can learn the skills needed to succeed. These skills include business management skills, finance skills, communication and negotiation skills, problem solving, networking skills etc. (Indeed, 2021). As mentioned earlier, entrepreneurs use deliberate practice (i.e., the five-hour rule) to hone their skills, but mentoring takes it a step further by holding the student accountable for their actions. For example, the mentor and the student may meet once in every two weeks. The mentor instructs the student to practise learning a skill specific for entrepreneurship e.g., sales, management skills, creativity etc. The mentor will then hold the student accountable by testing their knowledge on the subject in the next meeting. According to Hagg & Politis (2013) trust, motivation and questioning are essential elements to successfully mentor aspiring entrepreneurs. Trust is important because the student will be able to share their ideas with others which will open up opportunities when they network with other business professionals. Motivation allows the mentee to push through adversity by having a mentor that supports them on their journey. And questioning allows the student to stay curious in order to continuously learn and improve themselves. An example of mentorship is Steve Jobs who was Mark Zuckerberg's mentor. When Mark Zuckerberg was struggling in the early days of Facebook, Steve Jobs gave advice to Zuckerberg that he should reconnect with his original mission that he had for Facebook (Reeves, 2021). Arguably since then Facebook has been a success because of the experience the Steve Jobs was able to give to Mark Zuckerberg. Moreover 92% of small business owners said that a mentor had

a direct impact on growth and survival of their business. Moreover, 84% of entrepreneurs reached profitability in the first four years of their business, with 68% making profits in their first year because of having a mentor (Kabbage, 2022). Networking with likeminded people also helps to foster entrepreneurial intentions. For example, when the Collison brothers were starting Stripe they met Peter Thiel and Elon Musk to get some advice on how to build a secure financial payment system (Kennedy, 2011). In fact, Thiel and Musk were so impressed by the Collison brothers that they decided to invest in their start up in Stripe. This reflects the importance of networking with the right people.

Conclusion

This research has presented information that has suggested that both innate abilities (genes) and the context in which someone lives and works (environment) contribute to new venture creation.

The main genetic reasons for why people become entrepreneurs is because of their personality, their physiology, and certain characteristics they have. For personality, people decide to be entrepreneurs because they are extraverted, high conscientiousness, and low in neuroticism (McCrea and Costa, 1983). Meanwhile physiologically, entrepreneurs tend to have high levels of testosterone, adrenaline and low levels of cortisol (Patel & Wolfe, 2017). This suggest that these people engage in entrepreneurship because they want a career that involves a lot of risk taking, uncertainty and external stimuli because they enjoy taking on difficult tasks and find it exciting without getting stressed too much. Arguably, people also want to be entrepreneurs because they possess certain characteristics such as internal locus for control Rauch & Frese, (2007), self-efficacy, and the need for achievement (Bandura, 1977). This suggests that people want to be in control of their own career by being their own boss and to satisfy their ambitious goals i.e., financial success. Also, risk taking is a major

factor as Krammer & Goren, (2021) argue that risk taking is partially controlled or influenced by the DRD4 exon III gene.

The main environmental reasons for becoming an entrepreneur is being born into a family business. This is because the parent often acts a positive role model for the child, and they emulate the behaviours of the parent. One could suggest that early childhood experiences play a role as they are inspired by their parents and want to be like them when they grow up. Other key environmental reasons include deliberate practice, mentoring, and social networks. For example, the reason why some people become entrepreneurs is because most of the people the network with are entrepreneurs therefore they adopt the habits and behaviours of those individuals. Thus, individuals become the average of the five people the spend most time with i.e., someone who spends time with 5 entrepreneurs and they will become the sixth.

Overall, there is no definitive evidence to support the notion that being an entrepreneur is either down to genetics or to the environment. However, one can argue that both factors play an important role. For example, genes are important because it shapes your personality, which influences how you think about the world and yourself and how you regulate your emotions. Conversely, the environment contributes to varying degrees, the quality of your relationships with other people, which can allow individuals to gain access to new business opportunities. Therefore, the researcher would argue that entrepreneurs are neither exclusively born or exclusively made; rather it is a combination of nature and the environment.

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