Dual learning system performance for learners and businesses in the agri-food sector of Kazakhstan

Thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy

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Declaration of Original Authorship

I declare that this research is my original work, and I have acknowledged all citations from other sources properly and fully.

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Abstract

The lack of communication between educational institutions and businesses has led to a skills mismatch and a shortage of qualified professionals, leaving many graduates unable to secure jobs. The rise in self-employment among young professionals raises concerns about their commitment to specialised industries. Inspired by the successful implementation of Germany's dual learning system (DLS), Kazakhstan introduced this approach into its vocational and higher education sectors to address the shortage of skilled workers across its economy. DLS emphasises immersive, work-based training in collaboration with businesses, equipping students with essential skills for the modern workforce and easing their transition into employment. However, adopting international best practices, particularly in developing countries, requires tailoring to fit the specific social and economic contexts and industry needs. This study contributes to the literature by empirically studying the implementation effectiveness of DLS versus traditional education in Kazakhstan's agri-food business sector based on the perceptions of learners and businesses.

Implementing Focus Group Discussions with employers of 19 businesses of different sizes utilised a qualitative methodology based on the expectancy theory of motivation to understand the attitudes of employers and their motivation for participation in DLS. This study also aims to test satisfaction levels with the practice experience of learners (students and graduates) and factors influencing their intentions after graduation, i.e., whether they remain with the same employer in the agri-food industry, change employers in the same industry or leave the industry altogether. Evaluation is based on a multistage random sample of 651 learners undertaking dual learning system (hence dual) and 217 learners undertaking traditional education (hence non-dual). Kirkpatrick's training evaluation model provided the theoretical framework for designing satisfaction dimensions potentially influencing post-graduation decisions. Multinomial Logistic Regression was used to examine the career intentions of both dual and non-dual groups after graduation.

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Abbreviations and Acronyms

DLS:	Dual Learning System
VET:	Vocational Education and Training
NCE:	National Chamber of Entrepreneurs
TVE:	Technical and Vocational Education
TF:	Traditional Form
NCE:	National Chamber of Entrepreneurs
NQS	National Qualification Standards
ISCED:	International Standard Classification of Education
NQS:	National Qualifications System
SMEs:	Small and Medium-sized Enterprises
HCT:	Human Capital Theory
TPB:	Theory of Planned Behaviour
TP:	Theory of Participation
SET:	Social Exchange Theory
STEM:	Science, Technology, Engineering, and Mathematics
FGD:	Focus Group Discussion
FG:	Focus Group
PCA:	Principal Component Analysis
MNL:	Multinominal Logistics Regression
RQ:	Research Questions
STF:	Students of Traditional Form
GTF:	Graduates of Traditional Form
SDLS:	Students of Dual Learning System
GDLS:	Graduates of Dual Learning System
OECD:	Organisation for Economic Co-operation and Development
RIO:	Return on Investment

Part I

This section provides the reader with a detailed description of the research methodology, which includes the research design, data collection methods, and data analysis techniques. It also explains the rationale for choosing these methods and highlights their relevance to the research objectives. Additionally, it introduces research techniques and methods and provides a comprehensive literature review that serves as a solid foundation for this research.

Chapter 1. Introduction

1.1 Background of the research

Intense changes in the occupational structure and youth unemployment challenge many countries and have provoked a public debate around the contribution of vocational education and training (VET) in addressing these issues (Valiente and Scandurra, 2017). Countries adopting the German-originated dual apprenticeship showcase robust economic performance and low youth unemployment rate, prompting calls for VET system reforms (Fontdevila, Valiente and Schneider, 2022). This system includes mainly workplace training provided by a company and part-time theory learning in an educational institution, making students more prepared and experienced for their future careers (Dummert, 2021). The DLS offers benefits to all parties, including students, companies, and educational institutions (Pogatsnik, 2018). Students receive relevant skills and incentives, such as recognised work experience, enabling them to enter the workforce smoothly after graduation, thus making them stand out from their peers (Crépon and Premand, 2018; Wydra-Somaggio, 2021). By developing a pool of qualified and competent employees for themselves, employers are able to address their workforce needs efficiently (Natan and Ross, 2016). Additionally, the collaboration between academia and industry in DLS can lead to reduced costs for all participants in the educational system (Asghar, Shah and Akhtar, 2016). Finally, universities and colleges are expected to attract more motivated students, establish regular collaboration with enterprises, and increase recognition and interest among youth (Cantor, 2006).

Transferring international best practices to local settings, however, could be challenging (Lewis, 2007). While proven effective in developed countries, the dual training approach faces challenges and criticisms in developing nations, including concerns about access inequality, financial constraints, operational issues, and limited higher education opportunities (Valiente and Scandurra, 2017). Addressing these issues requires a holistic approach tailored to the unique circumstances and needs of each country and industry (Davoine and Deitmer, 2020). Hence, while dual apprenticeship programs are recognised as a potentially effective approach for training skilled professionals, implementing DLS necessitates an understanding of their interaction with broader social and economic contexts

of the country, considering its unique characteristics of the educational systems, labour market regulations, industry specifics and interactions of involved parties (authority bodies (such as NCE), businesses, educational institutions and students) (Deissinger, 2015).

In response to the resounding success of the German-originated dual apprenticeship programs, many governments, including Kazakhstan, have introduced similar initiatives in their national contexts. These programs aim to enhance the employability of young people and provide a smooth transition from school to work, mirroring the positive outcomes observed in Germany (Lewis, 2007). In 2012, Kazakhstan also adapted the German-originated dual apprenticeship or dual learning system (DLS) to its national vocational education system to reduce youth unemployment and help young people meet the needs of the labour market (Doskeyeva *et al.*, 2024). The main reason is the gap between educational institutions and businesses, resulting in a mismatch between student preparation and labour market requirements and increasing the shortage of qualified professionals (Muhambetaliev and Kasymova, 2016). For instance, in 2018, 40% of graduates were unable to secure a job within a year (Chulanova, 2021). Despite the stable youth unemployment rate in Kazakhstan (around 4% from 2020 to 2023), 60% of young people aged 15 to 34 are classified as self-employed, with the majority having VET degrees (Bureau of National Statistics, 2023). A survey by the National Chamber of Entrepreneurs (NCE) of Kazakhstan showed that in 2023, businesses demanded approximately 134 thousand workers, of whom over 50% had vocational education qualifications (NCE, n.d.).

Introducing the DLS in Kazakhstan involves close collaboration between educational institutions and companies, aiming to prepare students for their future careers by providing valuable opportunities to develop practical skills within authentic workplace environments (Deissinger, 2015). Unlike the traditional form (TF) of education (or non-dual), DLS delivers a much more immersive and extensive in-duration practice approach, leading to recognised work experiences for graduates (Tastanbekova *et al.*, 2021). This shift towards a new training strategy has prompted educational institutions to revise their programs, incorporating work-based training and increasing practical hours to 60-70 per cent of curricular programs, which is 20 per cent more than the practical hours allocated in the traditional approach (Doskeyeva *et al.*, 2024). A set of National Qualification Standards (NQS) has begun shaping the knowledge and skills required by professionals, as specified by employers of businesses (Kenzhegaliyeva, 2018). Thus, educational institutions and businesses have become stakeholders collaboratively involved in shaping the educational content and qualification

requirements for students. The government has formally recognised DLS with legislation, providing operational guidelines for all parties involved (students, educational institutions, and businesses) (Muhambetaliev and Kasymova, 2016).

1.2 Rationale

DLS implementation in Kazakhstan addresses the gap between traditional education and business needs, resulting in employment challenges for young people and professional shortages for businesses. Understanding these interactions is essential for tailoring the DLS to Kazakhstan's specific needs and ensuring its successful implementation. Therefore, it would be more relevant to focus on the performance of DLS implementation for these two involved parties—learners[1] and businesses (Alshynbayeva *et al.*, 2016; Muhambetaliev and Kasymova, 2016; Tastanbekova *et al.*, 2021).

Kazakhstani businesses are typically indirectly involved in educational processes by providing short-term professional practice for students and ad-hoc training for staff (coined as ‘non-dual’ businesses in this study). In contrast, businesses that engage in DLS (thus, 'dual' businesses) collaborate closely with educational institutions and are directly involved in training to ensure learners meet their needs (Doskeyeva *et al.*, 2024). This effort considers investing in the DLS organisation and is seen by businesses as an investment in human capital, resulting in expectations of both direct and indirect economic benefits (Helper *et al.*, 2016; Crépon and Premand, 2018). These benefits may include enhanced professional recruitment, increased productivity, decreased turnover, higher retention rates, improved workforce quality and reduced training and retraining costs (Muehlemann and Wolter, 2014; Pogatsnik, 2018). However, there is a risk of not reaping these benefits, mainly when investing in generic skills usually gained through training programs, such as apprenticeships. It is, therefore, imperative to understand the true motivations for businesses to engage in DLS and invest in training. Previous studies predominantly focused on understanding employee motivations across sectors (Lee, 2020; Piatak, 2022), as well as various aspects of apprenticeship evaluation, such as skill development (Brinia, Stavropoulos and Athanasoula-Reppa, 2018), employment prospects (Lassnigg and Vogtenhuber, 2011), and pedagogical outcomes (Karp and Hughes, 2008), rather than employer motivations and experiences (Rowe *et al.*, 2017).

The success of VET programs, such as DLS, is often determined by how learners complete the programs and whether they remain with the employers they trained with after

[1] Learners in this study cover both students and graduates.

graduation (Donkor, 2012). The reasons apprentices drop out have been studied in a number of aspects (Donkor, 2012; Laporte and Mueller, 2013; Lee and Chao, 2013; Bessey and Backes-Gellner, 2015; Nielsen, 2016; Seidel, 2019; Liu, 2021; Wydra-Somaggio, 2021; Beckmann, 2023; Holtmann and Solga, 2023). Nevertheless, these studies do not explore career choices after graduation, i.e., whether apprentices are considering remaining in the specialised employer/industry, instead primarily focused only on the completion rate of the training program by the apprentices. Since not all companies can offer jobs to all graduates, it is important to know if they intend to remain with the employer or industry after graduation. DLS graduates should ideally be able to smoothly transition into industry jobs right after graduation, which is also considered a positive outcome of DLS and should be taken into account when studying the career intentions of learners.

The level of satisfaction with the training provided in the workplace is one of the most important factors determining the intention to remain or leave a firm or industry (Wagner and Wolf, 2013; Forster-Heinzer *et al.*, 2016; Smyth and Zimba, 2019). Additionally, it is common for career intention research to lack a structured method for building satisfaction factors that primarily reflect satisfaction with the workplace, focusing on monetary dimensions (Werwatz, 2002), establishment-specific factors (Wagner and Wolf, 2013; Dummert, 2021) and motivational factors (Forster-Heinzer *et al.*, 2016). In order to ensure engagement, favourability, and relevance of training within DLS, all settings must be incorporated, including experience in educational institutions and workplaces.

The transformation in the education system has inspired Kazakhstani researchers to delve into implementing the German experience within the national education system. Studies on DLS in Kazakhstan highlighted challenges (Muhambetaliev and Kasymova, 2016) as well as progress in implementing the system (Kenzhegaliyeva, 2018) in vocational schools (Doskeyeva *et al.*, 2024) and at the leading Kazakhstani universities (Tastanbekova *et al.*, 2021). Earlier studies highlighted that DLS develops systemic ideas and creative skills in students (Alshynbayeva *et al.*, 2016), and public-private partnerships increase their level of preparation (Issayeva *et al.*, 2017). Later studies emphasised the enhancement of academic achievement in dual students and their confidence in the job market (Doskeyeva *et al.*, 2024). However, the research mentioned above needs to address the role of DLS in enhancing satisfaction and retention within the employer or sector, and more studies need to be conducted to address the perceptions of Kazakhstani businesses (employers) regarding the operation of DLS.

In this study, the agri-food industry will be particularly focused on since there is a severe shortage of qualified individuals in this sector (Kenzhin *et al.*, 2016). The agri-food industry in Kazakhstan is characterised by the post-Soviet political landscape that prompted a transformation in the agrarian structure, including a shift from large-scale, knowledge-intensive mechanised farming to two directions of farming that are characterised by modernised and intensified production systems (Abraliyev, Sugirova and Velesco, 2023) and household farming systems that are a primarily manual cultivation system on smaller plots (Toleubayev, Jansen and van Huis, 2010). Consequently, there was high demand for qualified individuals with farming experience (agronomists, veterinarians, and agricultural engineers) as well as for medium and low-skilled occupations (for example, tractor drivers). This can be confirmed by the Need for Personnel Analysis for 2022-2024 (NCE, 2022), where the agriculture industry ranks as one of the five industries with the greatest need for personnel with different levels of qualifications. This study focuses on the Akmola region (*Figure 1*), which is one of the leading agro-industrial regions of Kazakhstan that remains in demand for professionals (Nurtayeva, 2022). Increasing unemployment among young people is linked to the uncontrolled migration of young people from rural areas to cities (Kenzhin *et al.*, 2016), making it reasonable to delve into the intentions of students and graduates regarding their choices to remain or leave the agri-food sector. Additionally, the DLS was monitored in different industries in Kazakhstan selectively, bypassing the agri-food sector, which questions its comprehensive usefulness.

Source: (Salikova et al., 2021)

Figure 1. Research location

1.3 The scope and the objectives of the research

Given this backdrop, this research aims to examine DLS performance in the agri-food sector of Kazakhstan from both learners' and businesses' perspectives. From the business perspective, this study aims to assess the advantages businesses gain from engaging in DLS as compared to non-dual practices, such as ad hoc/traditional training, by studying the motivations of businesses for DLS participation and their perceptions on cost savings with the DLS and the improvement of employment (staff shortage) situation. From the perspective of students, this research assesses the DLS performance by comparing the satisfaction level with practical experience between dual and non-dual learners. Furthermore, the study aims to determine the factors that influence the intentions of dual and non-dual students and graduates to remain in their current training company (industry), to switch employers within the same industry, or to change positions unrelated to their trained specialisations (leave the industry).

The following research questions (RQ) and primary objectives have been established to achieve the outlined scope.

From the perspective of businesses:

RQ1. What are the reasons for conducting training and benefits derived from the DLS compared to ad-hoc/traditional training?

Businesses in many sectors of Kazakhstan are suffering not only from a shortage of personnel but also from a discrepancy between the knowledge acquired at educational institutions and the qualifications required by employers (Muhambetaliev and Kasymova, 2016). In contrast to the traditional approach, dual training entails reducing the gap between theory and practice by providing systematic and long-term training[2] in the workplace where the employer is directly involved in the training process (*Rules for the organisation of dual training*, 2016). Employers anticipate recruiting the most promising students during their practical training and after graduation, thereby addressing personnel shortages and qualifications (Brinia, Stavropoulos and Athanasoula-Reppa, 2018). However, studies suggest that companies are interested in a variety of benefits beyond recruiting qualified employees, such as access to cheap labour, government subsidies, and the enhancement of their profitability and reputations (Muehlemann *et al.*, 2007; Jansen *et al.*, 2015; Asghar, Shah and Akhtar, 2016; Chankseliani and Anuar, 2019). Therefore, by asking this question, this study aims to know the real

[2] An extended practical component (up to 60% of the curriculum) is required within a workplace environment for a maximum of 3 years and a minimum of 2 years.

motivations of agri-food businesses for participating in the DLS and the benefits they receive as a result of DLS involvement. It would be interesting to see whether the motivations of agri-food businesses are consistent with the concerns raised by governmental bodies, such as the mismatch in qualifications. This will also reveal whether there is a positive outcome from this involvement and may uncover challenges agri-food businesses face in organising DLS at the workplace.

RQ2. Do participating businesses consider the expense incurred in organising DLS higher than that from ad-hoc/traditional training?

Within the DLS, employers prepare future personnel for themselves, so they are more committed to organising training, creating content, working curricula, and educational materials, and providing a conducive environment for practising (Alshynbayeva *et al.*, 2016). Therefore, this engagement requires effort and financial resources from the training company (Chankseliani and Anuar, 2019). However, as opposed to the traditional approach, businesses can take advantage of significant cost savings by using the DLS when it comes to employee training and retraining and the need for recruitment (Lewis, 2015; Asghar, Shah and Akhtar, 2016), as it facilitates the development of its workforce tailored to the needs of businesses (Brinia, Stavropoulos and Athanasoula-Reppa, 2018). By comparing the cost items of dual and non-dual training, it is possible to understand the financial responsibility of businesses for organising dual training in their workplaces and whether they perceive the DLS investment as justified.

RQ3. Have businesses experienced a reduction in staff turnover and improved graduate recruitment since becoming involved in DLS?

The DLS in Kazakhstan addresses the gap between traditional education and business needs, resulting in employment challenges for graduates due to a skills mismatch, leading to increased youth unemployment and challenges with the recruitment of qualified professionals for employers (Muhambetaliev and Kasymova, 2016). DLS allows businesses to hire graduates who have undergone specially designed training tailored to meet the needs of the organisation (Mukhamadeyeva, Mukhamadeyev and Mukhamadeyeva, 2015). Furthermore, businesses have the opportunity to hire students during their training, which facilitates their preparation and adaptation to the corporate environment(Asghar, Shah and Akhtar, 2016; Bishop, 2017). This allows them to integrate into job responsibilities quickly and seamlessly,

thus making the transition from school to work more smoothly, which is beneficial for both sides (Seidel, 2019; Sauli, Wenger and Berger, 2021). Collectively, these may contribute to improving the overall quality of human capital and key employment outcomes such as turnover and recruitment within the company (Jansen *et al.*, 2015). By asking this question, this study aims to understand whether DLS businesses experience any positive changes in these areas compared to those using ad-hoc/traditional training approaches.

From the perspective of students:

RQ4. Do DLS learners have a better practice experience than students and graduates of traditional training?

Student satisfaction has been identified as one of the most crucial factors in empirical studies that measure apprenticeship performance (Gow *et al.*, 2008; Lalioti, 2019; Böhn and Deutscher, 2021) and shown that higher levels of student satisfaction are often associated with effective learning strategies and a positive educational experience (Alsalamah and Callinan, 2021; Liu, 2021). Considering that DLS provides learners with more immersive and extensive practical experience (since 60-70% of study hours are devoted to practice in the workplace) allows learners to gain a better understanding of the concepts they are studying, as well as gain valuable skills that can be applied to the workplace (Edmunds, 2007; Jackson, Fleming and Rowe, 2019; Tastanbekova *et al.*, 2021). Close collaboration between involved parties (such as colleges and enterprises) provides learners with a well-designed working curriculum, which facilitates the consolidation of theoretical knowledge into practice and allows for its immediate application in the workplace (Jjuuko, Tukundane and Zeelen, 2021). Having the support of mentors, getting practical hours that count as work experience, the opportunity to be employed during practice, receiving payment, and securing employment after graduation may have a positive impact on learners' overall satisfaction with the practice and the learning environment (Bishop, 2017; Mulkeen *et al.*, 2019; Howe *et al.*, 2023). That is why, by asking this question, this study wants to compare the satisfaction levels of students and graduates in dual and non-dual approaches to understand whether DLS offers learners a superior practice experience compared to traditional training.

RQ5. What factors impact the intention of dual and non-dual learners to remain in the training company (industry), change the employer within the same industry, or leave the industry?

It is vital that apprentices, after the training, are employed in their respective industries to mitigate the shortage of skilled professionals in a particular sector (Donkor, 2012). Recruiting dual graduates and retaining them in the training workplace or industry are often the determinants of DLS performance (Valiente and Scandurra, 2017). Dual businesses usually provide a particular number of practice places for interested students, depending on their capabilities and size (Lewis, 2015). Companies usually hire promising students during their practice period and offer them secure placements after graduation (Jjuuko, Tukundane and Zeelen, 2021). As the practical hours of DLS graduates count as recognised work experience, they can stand out among their peers and have better employment prospects in other positions in the same sector (Tastanbekova *et al.*, 2021). This outcome could be considered a positive outcome of DLS operations. Therefore, it is more reasonable to offer three outcomes for students and graduates to understand if factors such as their demographic characteristics, practice experiences, and motivational aspects of the training company influence their intentions to remain with the employer (industry) or leave the industry.

1.4 Contributions of the study

This study contributes to existing research by exploring the performance of German-originated training model implementation in diverse VET systems settings within a developing economy context, particularly from the perspective of learners and businesses in Kazakhstan's agri-food industry. It marks a pioneering effort in gathering and analysing primary data directly from agri-food enterprises and learners engaged in DLS in Kazakhstan.

This research also presents wide-ranging implications for the development of DLS in Kazakhstan. The government can leverage these results to form more informed policies concerning TVE programs, such as DLS, and develop more efficient and successful implementation methods tailored to the specifics of the agri-food industry. Moreover, this research can provide useful insights to DLS authorities, such as NCE, to ensure optimal DLS delivery across businesses, refine their policies and strategies and ensure the effective organisation of DLS, including its quality and expected results.

Education institutions and businesses can use the results from the perspectives of learners to enhance the delivery of study and practice activities. Instructors and mentors can

use gained insights to improve the teaching strategies and support they offer students, which may enhance their performance and provide a more enjoyable learning experience. Moreover, authorities can gain insights into factors that influence learning experiences and increase the retention rates of young professionals. These factors include not only satisfaction with workplace training, such as feeling supported by mentors, engaging in meaningful tasks, and receiving high-quality training, but also key motivational elements, including fair compensation, opportunities for career advancement, and positive working conditions. Businesses can develop effective strategies to motivate young professionals to remain in the training company. NCE and educational institutions could adapt DLS strategies to meet youth and business needs. Furthermore, it will enable policymakers to improve their understanding of the issues specific to the agri-food industry to address the shortage of skilled labour within the sector.

Lastly, this study will be of great value to future researchers in the field of DLS effectiveness evaluation. It also lays the groundwork for further advancements in the DLS approach and Kazakhstan's vocational education system overall. Examining DLS performance could involve other important participants, such as educational institutions, and be assessed across a variety of industries in a separate or collective manner.

1.5 Structure of research

This research has three parts. Part I provides a comprehensive overview of our research methodology and literature review, describing the foundational elements and specific research objectives. Part II examines the DLS performance in greater depth through two devoted chapters providing insights from businesses and learners. Part III summarises the primary conclusions drawn from our study and discusses their policy implications.

Chapter 2 offers a thorough examination of the DLS in the VET framework. It discusses worldwide VET systems, the origins and advantages of the DLS, its application and development in Kazakhstan, the organisational frameworks backing the Kazakhstani DLS, implementation challenges, various literature on business investment drivers, practice satisfaction, and factors affecting the career path of young individuals.

Chapter 3 introduces a theoretical and conceptual background of the study for conducting qualitative research on business and quantitative research on students. It explains how the Expectancy Theory of Motivation underlines the decision-making processes businesses undergo to determine their engagement in training activities. Furthermore, it

introduces Kirkpatrick's training evaluation model (Level 1), which is used to design dimensions of study and workplace satisfaction. Emphasis is also given to the methods and techniques used to examine employers' motivations to conduct the DLS, learners' satisfaction levels and their post-graduation decisions.

Chapter 4 provides empirical results on the DLS performance from the perspective of businesses, emphasising the reasons and benefits for involvement, such as cost savings and improved employment situation. Results are provided comparatively (between dual and non-dual businesses) to gain a comprehensive understanding. Focus Group Discussions (FGDs) were conducted with business representatives to understand their motivations and experiences to conduct DLS and ad-hoc/traditional training. The chapter delves into an understanding of whether managers perceive the DLS costs as justified and whether DLS is perceived to be a more efficient approach to training qualified personnel when compared to ad-hoc training.

Chapter 5 provides empirical results on DLS performance from the perspective of learners, encompassing both students and graduates. The assessment involved the utilisation of Mann-Whitney U and Kruskal-Wallis tests to make a comparative evaluation of the satisfaction levels related to practical experience among dual and non-dual learners. Multinomial Logistics Regression (MNL) analysis was used to identify the factors influencing the intentions of young individuals (dual and non-dual) after graduation: to keep their current training company (industry), to switch employers within the same industry, and to change careers unrelated to their trained specialisations (leaving industry).

Chapter 6 summarises the scope and objectives of the thesis by summarising answers to each research question related to DLS performance for businesses and learners. Additionally, the Chapter delves into the primary findings and discusses the limitations of the research.

Finally, Chapter 7 elaborates on the policy implications proffered for thoughtful consideration. These implications are strategically designed to provide guidance for advancing and refining the implementation of DLS within the agri-food sector.

Chapter 2. Literature review

2.1 Introduction

This Chapter thoroughly explains the DLS and its relation to the formal VET framework. It delves into the diverse landscape of global VET systems, explores the origins and advantages of the DLS, analyses its implementation and development within Kazakhstan, and outlines the organisational structures facilitating the Kazakhstani DLS as well as their responsibilities in involvement. In addition, it discusses challenges encountered during DLS implementation in various educational and economic settings. Finally, it investigates the literature on business investment motivations, satisfaction of learners with the practice and factors that impact the career trajectories of young individuals.

2.2 DLS and its connection to the formal VET systems

Dual learning usually refers to the duality of vocational education pathways in teaching and learning (Pogatsnik, 2018). It combines academic learning with practical training, aiming to balance theory learning at educational institutions and practical training at the enterprise with a particular distribution of training hours (Kocsis and Pusztai, 2021). This partnership could be expressed by sharing responsibilities in shaping educational content, determining costs between the state and the business sector, and recognising qualifications (Issayeva *et al.*, 2017). This collaboration is vital for successfully implementing vocational education programs, especially in the context of DLS. It highlights the active involvement of both state bodies and private enterprises in shaping educational programs, ensuring that graduates acquire the necessary skills and qualifications demanded by the labour market (Hiim, 2023).

DLS is established within the legal framework of the Vocational Education Law, emphasising its formal educational foundation (Pritchard, 1992). The system's extensive scope, as most students engage in it after completing compulsory education, reinforces its formal educational structure (Poortman *et al.*, 2014). DLS is also recognised by the Federal Institute for Vocational Education and Training as formal education since both learning environments of DLS – at the educational institution and within the company – have educational programs that follow state educational guidelines (BIBB, 2015). However, it is crucial to note that there

are VET system programs perceived as additional educational opportunities outside the formal education framework (CEDEFOP, 2020). In many European nations, VET is distinctly recognised as an initial vocational education, primarily at International Standard Classification of Education (ISCED) levels 3 and 4, serving as a specific component of a school-centred initial education structure (Pilz, 2016). Conversely, in certain countries like the UK, as well as partially in Ireland and Cyprus, VET is viewed as advanced training for individuals of all ages, including a significant proportion of mature learners, at various levels (including lower levels like ISCED level 2), provided by a broader array of higher education institutions (CEDEFOP, 2020). These offerings may encompass programs designed for unemployed individuals or second-chance initiatives, which align with the concept of VET without being exclusively associated with formal education. For instance, Continuing Vocational Education and Training in countries such as Greece, Spain and Italy is "understood as further education and training outside the formal education system, aiming at upskilling and employability goals or complementing knowledge, abilities and skills gained in initial education" (CEDEFOP, 2020, p. 33).

2.2.1 Diversity of vocational education systems

VET systems differ across countries, demonstrating notable disparities influenced by specific managerial and regulatory structures, alongside the distinct goals and incorporation into the labour market within individual national settings (Pilz, 2016). Scholars from diverse perspectives examined the variations of VET systems (*Table 1*). Greinert (2004) explores the development of vocational training models in Europe, highlighting how industrialisation has led to three main types: liberal market economy, state-regulated, and dual-corporate models, each reflecting different European thought principles on education and work organisation. Sung, Turbin and Ashton (2000) introduce a new way to look at VET differences by examining the interactions between the government, businesses, and workers, aiming to explain why these training systems differ and how they evolve over time. They distinguish between four models: market, corporatist, developmental state and neo-market models. Busemeyer and Trampusch (2011) discuss the characteristics of collective skill formation regimes from a political and economic perspective, emphasising different levels of commitment by the state and firms to skills formation. They distinguish four regimes: liberal skill formation systems, segmental skill formation regimes, statist skill formation systems, and collective skill formation. To evaluate the impact of upper-secondary education and training disparities on

skill opportunities and outcomes, Green and Pensiero (2016) used differences-in-differences analysis and differentiated four types of VET systems: school-based systems, systems with academic and vocational provision, systems with apprenticeship and mixed systems. To analyse employment rates among various age groups for individuals with both general and vocational education, Hanushek et al. (2017) utilised the same analysis and defined country groups by vocational share: vocational countries, non-school-based vocational and apprenticeship countries. Rageth and Renold (2017) presented a methodological approach for developing a three-level VET typology distinguishing VET from general education or labour market integration programs with maximal involvement between actors, sole involvement from the education system and fully employment-driven VET programs. More extended explanations of each VET classification mentioned above are provided in *Table 1.*

Referring to the descriptions of different VET system types (*Table 1*) allows DLS to be differentiated from other VET types, particularly in terms of managerial interactions among stakeholders and their involvement in economic and educational operations. Thus, DLS combines elements of both market and state regulation, emphasising collaboration between government, businesses, and schools to provide a balanced blend of practical and theoretical education, aligning with industry needs to prepare individuals for the workforce (Poortman *et al.*, 2014; Kocsis and Pusztai, 2021), which corresponds to the corporatist and dual corporates VET types (Sung, Turbin and Ashton, 2000; Greinert, 2004). By creating a partnership, stakeholders from the education and labour market are jointly responsible for creating and executing curricula. This method highlights the combination of theoretical knowledge from schools with hands-on experience from work environments (Hernández-Lara, Moral-Martín and Brunet-Icart, 2019; Jjuuko, Tukundane and Zeelen, 2021) and aligns with the VET classification type 1 (maximal linkage between actors) (Rageth and Renold, 2017) and school-based systems with apprenticeship type (Green and Pensiero, 2016). This engagement and dedication to training demonstrate a strong commitment from both the government and businesses to invest in vocational programs such as DLS (collective skill formation regimes type) (Busemeyer and Trampusch, 2011; Muehlemann and Wolter, 2014). Finally, DLS maintains a consistent duration at the upper-secondary level while offering training at the workplace that covers more than 60% of the curriculum (apprenticeship countries type) (Hanushek *et al.*, 2017).

Table 1. Different approaches to VET classifications.

Source	VET classifications	Explanation	Examples
Managerial perspective			
(Greinert, 2004)	The liberal market economy	Relies on a free market where education, labour, and capital interact without much restriction, but this can lead to issues like child labour due to structural disadvantages for workers.	First seen in Britain in the 18th-19th century
	The state-regulated model	Involves the government heavily in vocational training, aiming to qualify workers through a state-financed education system to balance the power between labour and capital.	First implemented in France
	The dual-corporatist model	It combines elements of both market and state regulation, with a focus on cooperation between companies and vocational schools to provide practical and theoretical education, ensuring that training is closely aligned with industry needs.	Mainly exists in German-speaking countries
(Sung, Turbin and Ashton, 2000)	The market model	Based on the idea that businesses and the economy should run with little control from the government, focusing on competition and the forces of supply and demand to shape industries and jobs.	The UK, USA and Canada
	The corporatist model	Businesses operate with little government help. The government, businesses, and groups representing workers communicate to make decisions on how best to prepare people for work.	Denmark, Germany, Switzerland, Austria and the Netherlands
	The development state model	The government plays a big role in helping industries grow, especially in countries that don't have natural resources like oil or gas to sell. The government works closely with businesses to ensure that there are enough skilled workers for the industries.	Singapore, Japan, South Korea and Taiwan all utilise market forces for wealth creation
	Neo-market model	This model is derived from nations where government-led initiatives were implemented to nurture their industries, with an emphasis on self-production rather than importing from abroad. However, this approach led to excessive dependence on exporting basic goods and taking out loans.	Chile, Mexico and Brazil
(Rageth and Renold, 2017)	Type 1	Involves maximal linkage between educational and employment system actors, sharing power in curriculum design and application.	Not mentioned
	Type 2	It involves actors solely from the education system, lacks linkage with the employment system, and focuses on traditional school programs.	
	Type 3	Fully employment-driven VET programs with all power vested in actors from the employment system, leading to unstandardised vocational qualifications and workplace-based training.	

Political and economic perspective			
(Busemeyer and Trampusch, 2011)	Liberal skill formation systems	Primarily occurs through markets and the general education system. Offers individuals generic educational qualifications, often supplemented with internships and summer jobs during education, followed by specific on-the-job training in early employment stages.	United States
	Segmentalist skill formation regime	Similar to the liberal system due to post-World War II influences. Firms show a higher willingness to invest in their employees' skill development compared to liberal regimes.	Japan
	Statist skill formation system	VET is emphasised as a viable alternative to academic higher education. It is fully integrated into the general education system, promoting educational mobility for individuals with vocational qualifications who wish to pursue tertiary education.	Sweden, France
	Collective skill formation regimes	Involves a strong commitment from both the state and firms to invest in vocational skills, with a unique balance between firm involvement and public commitment to training.	Germany, Austria, Switzerland, Denmark, Netherlands
Educational perspective			
(Green and Pensiero, 2016)	School-based systems	Offers general academic and vocational programs in upper-secondary institutions, lasting three years and leading to university or vocational tertiary education qualifications. Institutions have curricula with common core elements, but specific subjects based on disciplinary or vocational orientation.	Czech Republic, Denmark, Estonia, France, Finland, Greece, Italy, Netherlands, Japan, Poland, Russia
	School-based systems with academic and vocational provision	Has a higher degree of curriculum and assessment integration. Offers standardised core plus options programs or differentiated programs with subject specialisms.	Canada, Norway, Sweden. USA
	School-based systems with apprenticeship	It offers a balanced mix of school-based general education and employment-based apprenticeship. It offers a similar duration at the upper-secondary level but maintains distinct tracks with different regulations, curricula, qualifications, and progression opportunities.	Austria, Belgium, Denmark, Germany, Ireland, Luxembourg, Netherlands, Switzerland, UK
	Mixed systems	Offers diverse school and employment-based programs with dominant academic tracks. Characterised by flexibility and diverse providers. Regulation is more liberal and market-oriented, with diversity in programs and providers, including private training organisations and awarding bodies.	Australia, England, Northern Ireland, Ireland, Scotland, Spain and New Zealand
Statistics perspective			
(Hanushek *et al.*, 2017)	Vocational countries	Countries with a vocational share of at least 40%.	Belgium, Czech Republic, Denmark, Finland, Germany, Hungary, the Netherlands, Norway, Poland, Switzerland, and Slovenia
	Non-school based vocational countries	Of these countries above, those have a vocational sector with at least 25% in combined school and work-based programs.	Czech Republic, Denmark, Germany, Hungary, Poland, Switzerland
	Apprenticeship countries	Countries with a vocational share more than 40%.	Denmark, Germany, Switzerland

2.2.2 Apprenticeship as a component of DLS and a separate type of VET

Dual education and apprenticeship programs are closely related concepts, often intertwined in practice, yet they are not entirely synonymous (Pogatsnik, 2023). DLS aims to bridge the gap between theory and practice, education and production, thereby enhancing the quality of training for skilled staff (Tastanbekova *et al.*, 2021). Apprenticeship programs, on the other hand, are a subset of DLS. They specifically focus on the work-based learning component, enabling learners to acquire practical experience in a specific profession under skilled employees' supervision while participating in educational courses (Lehmann, 2000). DLS is a widely discussed topic in the VET context of countries such as Germany, Switzerland, and Austria. At the same time, apprenticeships are prevalent in other European Union countries that emphasise work-based learning as a key element of vocational training. Even though both concepts (DLS and apprenticeships) are integral to the VET landscape, addressing the need for a skilled workforce, the execution of such systems displays variances across diverse countries and settings. Cedefop (2018) identified 30 relevant apprenticeship schemes across Europe and gathered them into three groups (*Table 2*). The schemes of these groups vary in their purposes and functions, as well as in how they are implemented in national education and training systems. For instance, they differ in their duration (ranging from 1 to 4 years), structure (either one-stage or two-stage), target group (youth, adults, or unemployed), and governance/funding (provided by the state or businesses). As shown in Table 2, the DLS (of this study) falls under Group A, where apprenticeship is integrated into the formal education system and is governed by specific structures at all levels. In this scenario, the training hours in the company and at the college are predetermined and consistent nationwide. Conversely, apprenticeships in Group B offer an alternative method of delivering formal VET qualifications: through fully organised or blended apprenticeships based on VET curricula, programs, or training standards. In this case, the in-company training may be less regulated or not standardised, depending on the specific company. Finally, Group C apprenticeships blend the approaches of the two previous groups and are classified as a hybrid apprenticeship scheme. The key characteristics are its less rigid structure and detachment from the formal education and training system. Consequently, the qualifications obtained through this route are generally acknowledged as informal.

Table 2. Groups of apprenticeship schemes in European countries

	Group A - An education and training system	**Group B - A type of VET delivery within the formal VET system**			**Group C- A hybrid apprenticeship system**
Purpose	Providing people with full competence and capability in an apprentice-able occupation or trade	Providing a diverse way to deliver VET to achieve formal VET qualifications by bringing people into the labour market			Offering young people a way of reaching a qualification by bringing them into the labour market
Main function	Education and training function	Mixed education, training and employment functions			Strong link with social inclusion and employment
In-company training	Predefined and same for all companies	Less regulated and variable (at school-company level)			Less regulated and variable (at the school-company level)
Set-up	Apprenticeship programs	Apprenticeship programs	Full apprenticeship individual pathways (only)	Full and partial apprenticeship individual pathways	Apprenticeship programs
Schemes	**Dual apprenticeship** (Austria), **Dual system** (Germany), **Apprenticeship** (Denmark, Iceland) **A unified model of education** (Croatia), **Apprenticeship qualification** (Estonia), **Upper secondary vocational programs** (Norway), **Vocational preparation of young persons: occupational training** (Poland)	**Dual pathway** (Netherlands), **Apprenticeship Programs** (Portugal)	**Part-time vocational secondary education with part-time or apprenticeship contract** (Belgium), **Apprenticeships for SMEs with part-time or apprenticeship contract** (Belgium), **Workplace-based Learning** (Estonia), **Apprenticeship contract** or **Professionalising contract** (France), **Apprenticeship contract** (Luxembourg), **Apprenticeship at the Workplace** (Romania), **Apprenticeships** (UK-England), **Modern Apprenticeships** (UK-Scotland)	**Dual training/dual contract (education subsystem)** (Belgium), **Dual VET with apprenticeship contract** (Spain), **Apprenticeship training** (Finland), **Dual vocational training with apprenticeship training contract** (Hungary), **Type 1 apprenticeship in upper secondary education** and **Type 3 higher education apprenticeship** (Italy), **Apprenticeships in upper secondary** (Sweden)	**Dual training/dual contract (vocational training subsystem)** (Belgium), **New Modern Apprenticeship** (Cyprus) **EPAS apprenticeship** (in Greek, 'Epagelmatiki Sxoli' means 'Professional school') (Greece)

Source: (CEDEFOP, 2018)

2.3 DLS origin and its benefits

The history of the formation and development of duality in learning began in Germany, and its development can be divided into four main stages (Lewis, 2007). Early forms of apprenticeship were introduced into the training of craftsmen, dating back to the Middle Ages (Lewis, 2015). The apprentice worked alongside his master to follow the principle of a sequence of actions: observation, imitation, autonomous execution and individualisation (Rubain and Nouatin, 2021). This principle aimed to provide the apprentice with skills and abilities appropriate to their future profession and to mastering a particular craft.

The emergence of dual education in Germany can be attributed to the end of the 19th and beginning of the 20th centuries (the second - education phase), owing to advancements in technology and culture within the industrial and societal spheres (Pritchard, 1992). Changes in retail trade since 1897 allowed the restoration of corporate structures and an apprenticeship model comparable to the previously existing craft system (Deissinger and Hellwig, 2005). In 1900, German educator Georg Kerschensteiner recommended recognising such dual education as legal, noting that vocational training and work contribute to the overall development of the individual (Lewis, 2007). By the beginning of the 20th century, the number of profession-oriented schools increased significantly. Such education contributed to the development of small and medium-sized enterprises (SMEs) and supported young people during the crisis at the turn of the twentieth century (Deissinger and Hellwig, 2005).

The consolidation (third) phase of the dual system dates back to 1920-70 when German industries tried to create their own apprenticeship model to exercise control over companies (Bender, 2022). This was motivated by the crisis of the post-war period, which contributed to Germany's economic recovery and growth by meeting the demand for skilled labour (Deissinger and Hellwig, 2005). Since then, schools have transformed and been renamed vocational schools. In addition to this adjustment, a three-year mandatory education program was implemented, and the training hours were adjusted to match the curriculum, which was agreed upon by both school authorities and enterprise management (Graf, 2018).

The last phase of DLS development has been characterised by rationalisation since 1970. The legal foundation of the DLS was established with the Vocational Education Law (Berufsbildungsgesetz) in 1969, which was a central legislative instrument for in-company training in Germany (Deissinger and Hellwig, 2005). The responsibilities of the federal government, the German states, employers, and teachers have started to be clearly regulated.

In addition, vocational training centres have been established since 1972 and have been effectively used mainly by small enterprises (Casey, 1991).

Today, the dual system in Germany provides broad vocational training and competencies for 324 recognised training occupations (Rözer and van de Werfhorst, 2020). In 2020, 19.7% of German SMEs (approximately out of 2.1 million) participated in the dual system (Federal Institute for Vocational Education and Training, 2022). Companies offer over 578,200 new training places for students annually and recruit 71% of graduates after the training. A large share of investments falls on enterprises, which approximately invest 20,855 EUR per trainee a year, and 69% of these gross costs are recovered during the training period by the productive contribution of trainees (Federal Institute for Vocational Education and Training, 2022). This combining firm-based training with vocational schools has contributed to Germany's low youth unemployment rate (5.6% in 2019) (Dummert, 2021).

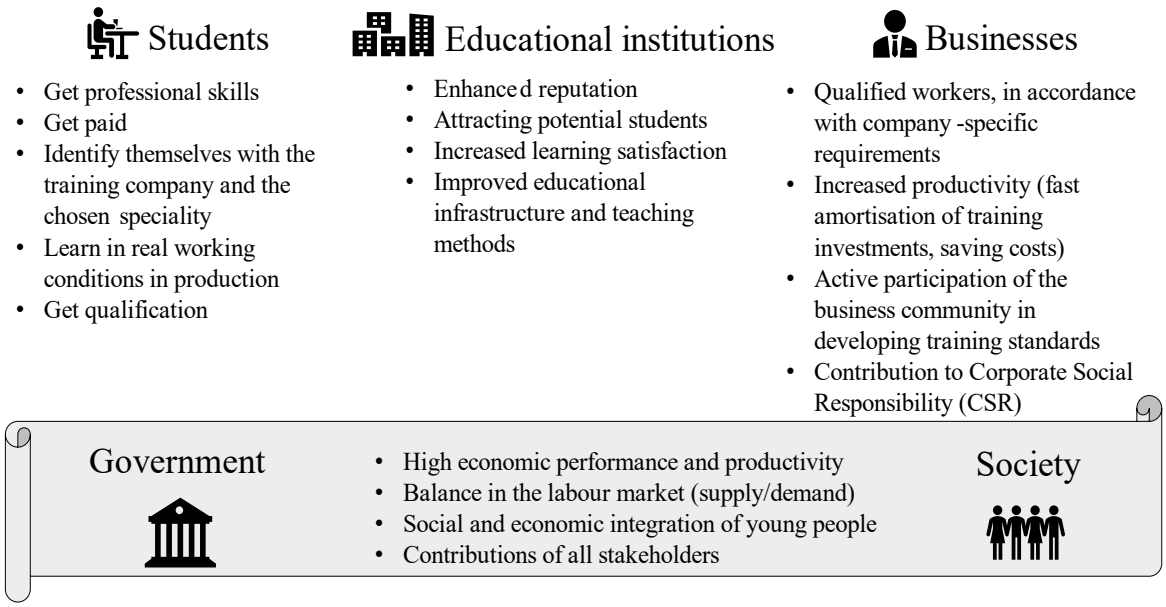
The German DLS offers distinct benefits for governments, companies, educational institutions and students, leveraging a collaborative framework that integrates theoretical learning with practical experience (GOVET, n.d) (*Figure 2*).

Students acquire valuable professional skills directly relevant to their selected field, granting them a competitive advantage in the labour market after graduation (Doskeyeva *et al.*, 2024). Moreover, students could be offered a position in the training company, enabling them to be paid during the practice (Liu, 2021). The opportunity to learn in authentic work settings also allows students to establish a connection with their training organisation and chosen specialisation, potentially leading to heightened job contentment and future career prospects (Lewis, 2015). Upon finishing the program, students attain a recognised certification that allows them to stand out of the crowd and further boost their employability (Lalioti, 2019).

Businesses gain advantages from the DLS as they are able to actively participate in the training process, guaranteeing that the abilities students gain are in line with the specific position or qualification requirements (Vogelsang *et al.*, 2022). A shift towards more collaboration with educational institutions enables businesses to influence curricula and standards to a certain degree to provide skills tailored to their needs (Garrod and Macfarlane, 2007). This results in increased productivity, leading to faster amortisation of training investments and reducing expenses related to on-the-job training, retraining, adaptation and recruitment (Pogatsnik, 2018). All these efforts contribute to the overall corporate social responsibility of the company (Polyakova, 2018).

Educational institutions benefit from DLS by enhancing their reputation and appealing to potential students looking for secure career paths after graduation (Pogatsnik, 2023). The participation of businesses in the educational process through the DLS also brings opportunities to enhance the educational infrastructure and learning experiences provided by institutions (Fontdevila, Valiente and Schneider, 2022). DLS can act as a platform for educational institutions to innovate and adjust their teaching methods to incorporate more useful practical learning (Rageth and Renold, 2017).

For the government and society, DLS contributes to a well-organised and high-quality training infrastructure that balances the supply and demand of apprenticeships, ensuring a skilled workforce that supports economic competitiveness and significantly contributes to higher economic performance and productivity (Graf, 2018). Equipping young people with valuable skills, work experience, and pathways to sustainable employment is crucial for the social and economic integration of the youth (Valiente and Scandurra, 2017). Finally, a cooperative approach of DLS contributes to all other stakeholders, such as educational institutions and businesses, ensuring labour market development (Lassnigg and Vogtenhuber, 2011).



Source: (GOVET, n.d)

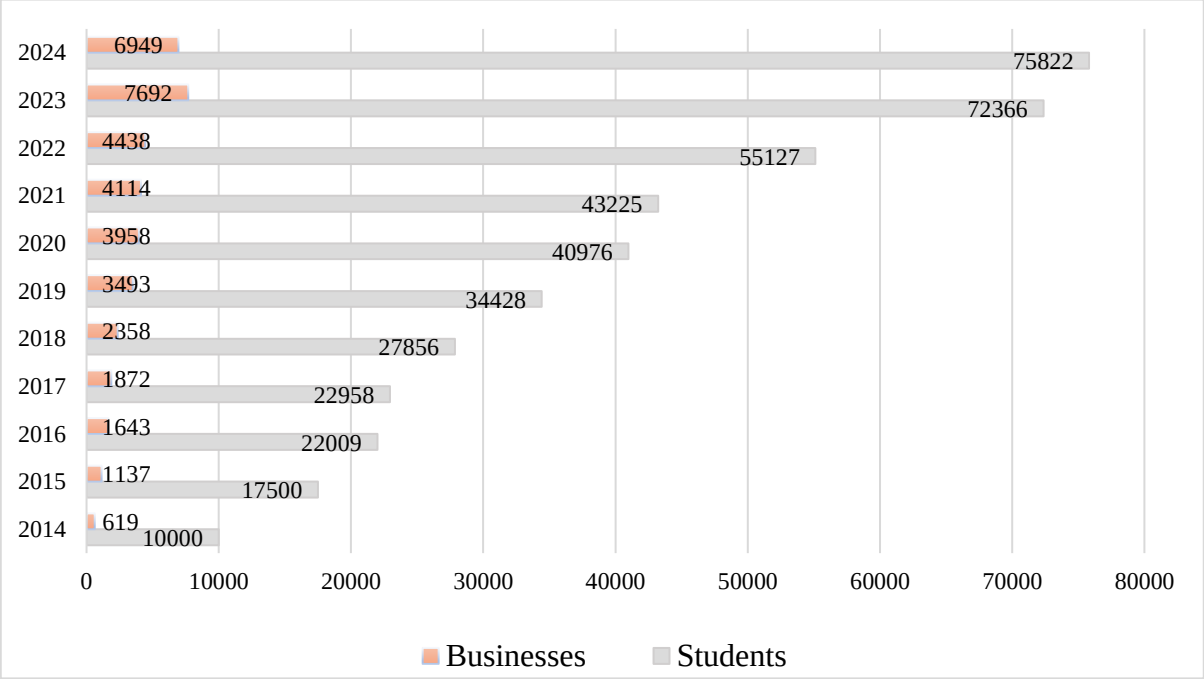
Figure 2. Benefits of the DLS

2.4 Implementation and development of DLS in Kazakhstan

In response to the positive experiences of German-originated DLS, many governments have introduced dual learning programs in their national contexts to reduce unemployment, enhance the employability of young people and provide a smooth transition from school to work (Lewis, 2007). The implementation of a DLS in Kazakhstan started in 2012 with the introduction of the policy article (*Social Modernization of Kazakhstan: Twenty Steps to the Society of Universal Labor*, 2012) by ex-president Nazarbayev. Its concepts were first introduced to TVE institutions, where 25 colleges participated in the pilot initiative. In 2014, the "Implementation of DLS" road map was created, which included the establishment of a regulatory legal framework, financing, management, and development of the DLS infrastructure, covering 83 different specialities (educational programs) across 11 priority sectors (LIS 'Adilet', 2014). In the meantime, the National Qualifications System (NQS) was initiated in Kazakhstan with assistance from the World Bank for Reconstruction and Development. As part of the cooperation, methodological recommendations for designing professional standards and educational programs based on these standards and guidance on developing educational programs in the context of the NQS and labour market needs were developed. By the end of 2023, 597 professional standards have been approved, which is only a quarter of all types of occupations (NCE, n.d.).

Significant progress was made by acknowledging DLS through legislation. In 2016, the creation of *Rules for the organisation of dual training* (2016) proposed guidelines detailing the process and structuring of the DLS. It also delineates the roles and responsibilities of stakeholders within the system, including the main authority body, the NCE, and educational institutions and businesses. Later, the "dual learning" concept was integrated into other related legislations, such as *Labour code* (2016) and *Law 'On Education'* (2021).

Since the launch of the DLS, 543,8 thousand students have been involved in this learning approach, and their number has increased annually, from 10,000 in 2014 to 75,822 in 2024 (NCE, n.d.). In 2014, 619 training companies and 25 educational institutions were involved, and after the decade, they increased more than tenfold to 6949 and 469, respectively (*Figure 3*).



Source: (NCE, n.d.)

Figure 3. Number of students and businesses involved in DLS

According to the *Rules for the organisation of dual training* (2016), DLS comprises at least 60% practical education in production and 40% theoretical instruction in educational institutions. In the meantime, educational institutions can modify up to 80% of educational program content in collaboration with employers and have freedom regarding training schedules. Recent changes in DLS operations consist of acknowledged qualifications and practical hours for DLS students, which are considered work experience to enhance employability prospects. Further changes encompass establishing *Rules for organising dual education in organisations of higher and/or postgraduate education* (2023) to determine the DLS organising procedures in universities. Initiatives are being put into place to encourage employers to engage in DLS, such as reimbursing them costs for mentoring, which usually involves a staff member assigned to supervise and teach a group of students (Doskeyeva *et al.*, 2024). Efforts are currently being made to provide teaching skills for mentors from training businesses.

2.5 Organisation of the DLS in Kazakhstan

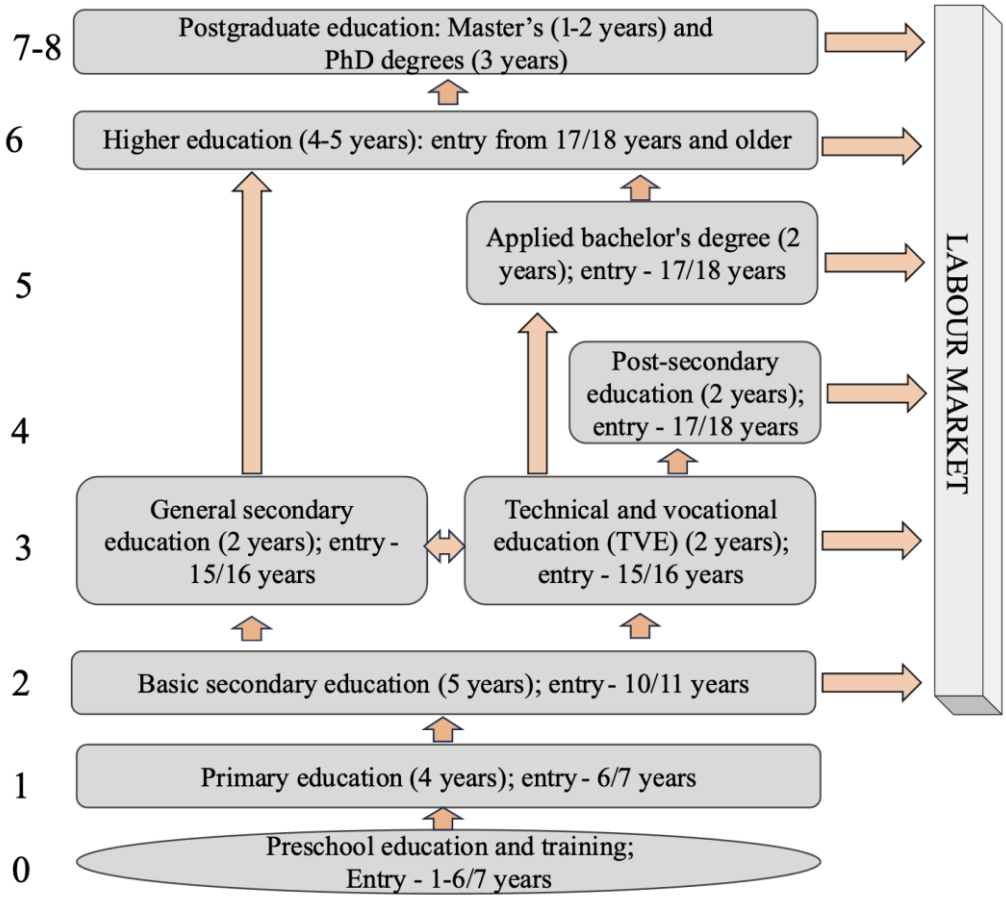
The education system of Kazakhstan is characterised by its multi-tiered framework and continuous development, covering various educational phases (IQAA, no date). It covers preschool education and training, followed by primary education and basic secondary education, which encompasses general secondary education and TVE, providing qualifications of a worker and a mid-level specialist. Postsecondary education grants the qualifications of a worker with a high level of discharge, while incomplete higher education (Bachelor of Applied Science) signifies the subsequent phase for a higher qualification. Higher and postgraduate education (Master program and PhD) is tailored for individuals with a high level of qualifications and finalises the structure of the education system (*Figure 4*).

DLS was first introduced to Kazakhstani's TVE system, which is equivalent to secondary vocational education at levels 3 and 4 of the International Standard Classification of Education (IQAA, no date). Students who finish secondary school in years 9 and 11 are eligible to join TVE institutions (colleges). The curriculum for students entering TVE after year 9 includes both general secondary and TVE courses. Those enrolling after year 11 solely undergo the TVE program. Upon completion of college, TVE graduates have the option to enter the labour market or pursue further higher studies (Doskeyeva *et al.*, 2024) (*Figure 4*).

DLS is not considered a substitute for TVE but rather is integrated into the vocational education system. Essentially, the framework of the education system remains unchanged. The introduction was solely focused on a curriculum that emphasises extended and immersive practical training developed in cooperation with businesses (Davoine and Deitmer, 2020). As a result, DLS is currently being implemented alongside traditional training (non-dual) since not all educational institutions have fully embraced it yet.

DLS provides a more immersive learning environment that directly mirrors industry conditions (Liu, 2021). Unlike non-dual experiences, DLS involves a long-term commitment to a real work environment, spanning several years, while practice in a traditional approach involves mostly classroom-based learning with subsequent short-term (1-3 months) practical training. For businesses intending to be involved in the DLS, the process includes expressing their intentions by applying to the NCE, subsequently establishing partnerships with educational institutions and following guidelines for organising dual learning at the workplace (Doskaliyeva *et al.*, 2018). This process is standardised across all businesses. At the beginning of the first year of study, students express their intentions to enrol in the DLS through a three-

party agreement with the educational institution and the training company (business) (*Rules for the organisation of dual training*, 2016).



Source: (IQAA, n.d.)

Figure 4. Structure of the Education System in Kazakhstan

A major difference between DLS and traditional training in TVE is the collaborative effort in shaping curriculum between businesses and educational institutions, leading to work-based learning with increased practical hours (up to 60%) (Alshynbayeva *et al.*, 2016; Doskeyeva *et al.*, 2024). Thus, this approach requires more responsibilities and investments from businesses to DLS organisations (Tastanbekova *et al.*, 2021). Unlike the traditional approach, DLS offers a work-based environment mirroring industry conditions, which provides graduates with recognised work experiences and qualifications, allowing them to stand out from the crowd and giving them better employment prospects (Kenzhegaliyeva, 2018). *Table 3* describes more detailed distinguishing characteristics of DLS (dual) and the traditional (non-dual) approaches.

DLS elements (not a whole framework) were subsequently integrated into higher education by increasing the number of practical hours (Issayeva *et al.*, 2017). Still, there are other changes in the training organisation compared to the traditional approach (Kocsis and Pusztai, 2021). Despite the fact that universities develop academic disciplines and working curricula for DLS, they should be developed independently for each training business, taking into account the characteristics of the production activities, which were not considered before. When determining the ratio of training sessions at a university and work, it is assumed that at least 40% of the educational material of the discipline is practised directly at the workplace, which is 20% more than in traditional education (Tastanbekova *et al.*, 2021). Certification of dual students is conducted by the university, with mentors and specialists from the training businesses being involved, whereas business representatives do not participate in the marking processes in traditional practice (*Rules for organising dual education in organisations of higher and/or postgraduate education*, 2023).

Table 3. Distinguishing characteristics of dual and non-dual approaches in TVE (identified from the literature)

	Dual	**Non-dual**
Provided training structure and duration	A formal form of education that integrates classroom education with practical training directly within a workplace environment, with extended practical hours (up to 60% of the curriculum). It involves systematic and longer-term commitment with a maximum of 3 years and a minimum of 2 years.	A classroom-based approach with subsequent short-term practical training is a part of formal education spanning 1-3 months, depending on the type of professional practice (educational, industrial, and pre-graduate), and could involve 40% of study hours.
Partnerships and responsibilities	Establishes strong collaborations between educational institutions and is equally responsible for training quality and content. Facilitates the consolidation of theoretical knowledge into practice by providing opportunities for immediate application in a workplace, employment during practice and compensation.	According to the curriculum, it relies on partnerships with educational institutions with limited training responsibilities and aims to provide its best practices in a particular period. Usually, due to the short training period, they do not employ interns during their practice.
Involvement	Directly participates in developing content, working curricula, educational and methodological complexes, and organising training. Provides mentor support and invests in organisational settings. They are more interested in training since they train staff for themselves. Students are certified by the involvement of mentors and specialists from the businesses.	Limited direct involvement in educational processes. Students mostly follow curriculum and working programs designed and approved by educational institutions. Examinations and results on practice are carried out only by educational institutions.
Qualification	Provides recognised qualifications and practical hours counted as work experience.	Provides recognised qualifications, but practical hours do not count as work experience.

The Ministry of Education of Kazakhstan, as the authorised body, offers guidance on the coordination of the educational process involving the DLS among NCE, businesses, and educational institutions (*Rules for the organisation of dual training*, 2016). *Table 4* breaks down these responsibilities into specific steps, where distinct roles of each party are outlined. It emphasises the collaborative nature of the DLS, where businesses, NCE, and educational institutions work together to create a structured learning environment.

Table 4. DLS organisation processes and responsibilities between the main involved parties

Steps	Businesses	NCE	Educational institutions
1	Determine the requirement for personnel (position, duration, qualification).	Monitor the requirements of businesses for a skilled workforce; Provide training for mentors; Establishes a database of educational institutions.	
2	Submit an application to the NCE about available training places.	Identify training workplaces and educational institutions according to enquiries.	
3	Make a three-party-agreement on DLS between student, enterprise and educational institution		
4	Familiarise with the material and technical base of the educational institution; Make recommendations for adjustments to the educational process.	Facilitate a three-party agreement; Register and maintain agreements on DLS.	
5	Coordinate the educational process schedule with the educational institution.		Develop and coordinate the educational process schedule with the enterprise.
6	Coordinate curricula and programs of DLS	Coordinate participation in developing educational materials, curricula, and plans between businesses and educational institutions.	Develop educational programs taking into account the requirements of the businesses.
7	Ensure the organisation of DLS training: - allocate equipped learning and training places; - assign a mentor; - conduct briefings on safety regulations; - provide the student with personal protective equipment;		Create the required conditions and implement educational programs, taking into account the businesses' recommendations; Monitor the completion of DLS training of students.
8	Provide payment to the student in case of employment during practice.		
9	Participate in students' certifications and exams.		Conduct students' certifications and exams.
10	Asses and provide a reference letter on students' work.		
11	Provide a position after graduation (if there is a vacancy).		
12	Promote the employment of DLS graduates.		

Source: (Rules for the organisation of dual training, 2016)

2.6 Challenges of DLS implementation and adaptation critiques

While apprenticeships offer numerous potential benefits, businesses often encounter challenges when engaging with this training system. Analysis of Chankseliani and Anuar (2019) across ten countries found that many companies perceive apprenticeships as costly, complex, and risky investments despite the advantages. Lewis (2015) conducted focus groups with in-company trainers to examine their points of view on the Swiss vocational program and identified weak collaboration between schools and training firms. Additional studies by Rowe *et al.* (2017), Mulkeen *et al.* (2019) and Kaprawi *et al.* (2021) underscore various critical challenges faced by employers in apprenticeship programs, encompassing low completion rates, retention issues, mentor training, logistical concerns, and other issues related to the education system and training providers.

Adapting models developed in other countries, such as the German-originated DLS, can be successful only when the cultural characteristics and conditions under which they were created are considered (Lewis, 2007). Li and Pilz (2023) emphasise that the outcomes of VET system transfers could be uncertain due to the diverse and dynamic framework conditions in different countries, encompassing economic development, the education system, labour market structure and socio-cultural context. Many factors contribute to adaptation failure, including firm size, industry, type of work environment, economic cycle, government incentives, and other social-institutional elements (Valiente and Scandurra, 2017). Scholars also emphasise that success often depends on the synergistic interaction of various elements at both micro (e.g., within a company) and system levels (national policies, institutional cooperation (schools, companies), cultural attitudes toward vocational training, economic conditions (labour demand), and company-level commitment) (Davoine and Deitmer, 2020). Hence, examining the performance of imported apprenticeship programs is essential in considering the distinct educational frameworks and labour market regulations of each country.

Resource constraints (Smith *et al.*, 2019), operational inconsistencies in coherence (Fontdevila, Valiente and Schneider, 2022), institutional coordination issues (Hernández-Lara, Moral-Martín and Brunet-Icart, 2019), and inadequate workplace learning supervision (Jjuuko, Tukundane and Zeelen, 2021) contribute to variations in training quality, undermining program performance. Key concerns in the apprenticeship programs in developing nations encompass the economic constraints that limit resource allocation for these programs (Kaprawi *et al.*, 2021), provide unequal access to education and training opportunities (Pilz and Regel, 2021, p. 117) and increase hesitancy from industries to engage (Vogelsang *et al.*,

2022). Additionally, developing countries often lack the capacity for systematic data collection and analysis, which makes it challenging to assess the outcomes of these programs (Valiente and Scandurra, 2017).

2.7 Investment intentions of businesses from the perspectives of theories

Investing in DLS settings is seen by businesses as a strategic investment in their human capital, bringing direct and indirect economic and social benefits (Helper *et al.*, 2016; Crépon and Premand, 2018). Apart from heightened productivity, employers gain from reduced turnover, increased retention rates, acquisition of skilled employees, and lower retraining costs (Muehlemann and Wolter, 2014). Research on work-based learning highlights advantages that justify the investment. For example, Pogatsnik (2018) conducted interviews on dual training in engineering education in Hungary, finding that it enhances workforce quality, reduces hiring costs, and improves recruitment efficiency. Smyth and Zimba (2019) revealed that the advantages of the apprenticeship program outweighed the associated costs. Crépon and Premand (2018) explored the indirect impacts of apprenticeship programs, showing they enhance the net value of the company.

Becker (1962) argues that employers invest in human capital to make a profit in the future and that education and training are investments in future productivity. Although human capital theory (HCT) did not consider apprenticeship (in our case, DLS), it was often seen as an investment in human capital and a catalyst for new theoretical concepts (Helper *et al.*, 2016). The theoretical importance of HCT was the distinction between investment in general and specific training (Becker, 1962). General training imparts skills transferable to various workplaces, yet businesses prefer providing it without incurring costs. Workers might be paid less during general training than their current productivity. Conversely, specific training solely benefits the training firm. If a graduate leaves, the investments of the firm are at risk. To mitigate this, businesses may be inclined to share the expenses of specific training to recover their investments in specific skills, particularly in employee-initiated departures (Acemoglu and Pischke, 1999). This is particularly relevant in the context of the DLS in Kazakhstan, where many of the skills are broadly applicable across the sector rather than specific to a single firm.

Researchers have developed new models and reconsiderations of the human capital theory that explain why firms are willing to invest in general skills that would benefit other firms in addition to themselves. To better understand the motivations of firms to invest in

DLS—despite its focus on general skills that could benefit other firms—following paragraphs draws on extended versions of Human Capital Theory. These recent theoretical arguments (insights) help explain why, in real-world market conditions, employers still see value in offering such training.

Pay compression. Acemoglu and Pischke (1999) explain that investing in general skills results in labour market frictions that lead to a compressed wage structure. Investing in general training, in this case, becomes profitable for firms, as wage compression leads to a situation in which wages increase with training more slowly than productivity, creating a wedge between productivity and wages that rises with skill growth. This result was consistent with later studies of Dustmann and Schönberg (2004), who used a German apprenticeship program and Almeida-Santos and Mumford (2004), who tested both frequency and timeframe of training and found it to be positively correlated with wage compression in non-competitive training models. Bassanini and Brunello (2008) also found that firm-sponsored training is more prevalent in countries with pronounced wage compression than in other countries.

Informational asymmetry. Katz and Ziderman (1990) and Bar-Isaac and Leaver (2021) proposed that there may be asymmetry in information regarding how much and what kind of training workers receive. The degree of preparedness of specialists trained in another workplace is not clear to potential recruiters. Furthermore, apprentices may have received a different type of general training inconsistent with their new occupation. All this leads to the fact that the recruiting firm will value the hired employee with general training less than the firm that trained them. As a result, the informational asymmetry between the training firm and the recruiter reduces the net benefits that a worker with general training can derive from moving to a different employer. This entails partial or full funding for the general training of the worker. Acemoglu and Pischke (2000) argue that informational asymmetry creates a firm's monopsony power over its skilled workers and thus encourages them to invest in training but discourages workers from making an effort.

General and specific skills interactions. Bishop (1996) explains that the training company does not endorse skills to other firms for fear of losing an already skilled worker to a higher-paid employer. Also, there is no guarantee that an employee will receive more wages from another employer. These phenomena transform skills, making them more specific to the firm, where wages will grow more slowly than productivity. Lazear (2009) created the skill-weights model, explaining that a particular mix of general skills creates a monopsony power because it limits the number of firms competing for a particular combination of skills and

increases the cost of changing jobs. Thus, employers intend to invest in training. Kessler and Lülfesmann (2006) believe that a firm can invest both the general and firm-specific human capital of its employees since all types of investment (in general and specific skills) interact.

Competition in the market. According to the theory of Bassanini and Brunello (2007), market deregulation and training are strongly associated. If the number of firms increases due to deregulation, training income also increases, encouraging firms to invest in training. This is because in more competitive markets, firms are under pressure to increase productivity and efficiency to maintain or grow their market share. One way to do that is by upskilling their workers through training. Well-trained employees contribute to innovation, faster adaptation to new technologies, and higher performance — all of which are crucial in a competitive environment. A similar conclusion was reached by (Lai and Ng, 2014), who conducted a study using Canada's Workplace and Employee Survey and found that competition strongly influences workplace learning. Heywood, Jirjahn and Pfister (2020) used German establishment data to examine the training provided by employers in relation to product market competition. Despite the fact that they found that responses to competition in the product market varied across industries, they did not deny that competition in the product market increased training. The main thing is that competition does not threaten the survival of the firm.

Recruitment costs. The results of Muehlemann *et al.* (2007) demonstrate that costs are vital in the decision-making process regarding training. A company's hiring costs may differ, leading some firms to train while others hire. Blatter *et al.* (2012) got the same result, indicating that the cost of hiring is rising, and organisations will offer more internal training jobs to meet their demand for skilled personnel.

In DLS, skills for positions align with the national curriculum and adhere to NQS, which employer associations collaboratively develop and encompass qualifications, competence, content, quality, and working conditions (Kenzhegaliyeva, 2018). Therefore, they can be shared with many businesses and are more general than specific in nature (Muehlemann and Wolter, 2020). The traditional approach also imparts transferable general skills, enabling students to succeed in diverse domains, while DLS goes beyond basic skills (literacy and numeracy) by providing job-related education (Jackson, Fleming and Rowe, 2019). Given that DLS facilitates the acquisition of general skills, it is crucial to comprehend the motivations that drive businesses to engage in DLS.

While HCT and its extended theoretical arguments are useful in explaining the economic rationale behind firms' investment in training, there is a need to focus on main theoretical framework that better aligns with the aim of the research and gives an understanding on motivations of businesses that choose to engage in the DLS.

While the reviewed theories above might provide some understanding of the varied intentions behind investments of businesses, they did not provide a foundation towards understanding the motivations or process in decision-making. For example, they do not explain the underlying motivation — what drives that intention. Motivation or decision-making process in this research refers to evaluative steps that business leaders go through when deciding whether or not to invest in the DLS. This research utilises the Expectancy Motivation theory by Vroom, Porter and Lawer (2005) as a conceptual background to comprehend the motivation of businesses and the related expectations that prompt their involvement in DLS. The depiction in *Figure 5* illustrates how the Expectancy theory encompasses three fundamental motivational beliefs: expectancy, instrumentality, and valence. Expectancy pertains to the belief that an individual's efforts will result in attaining desired benefits (Chopra, 2018). Instrumentality is the notion that the receipt of a reward is dependent on meeting performance standards (Gyepi-Garbrah *et al.*, 2023). Lastly, valence denotes the value an individual places on rewards based on their personal needs, goals, principles, and motivations (Chopra, 2018).

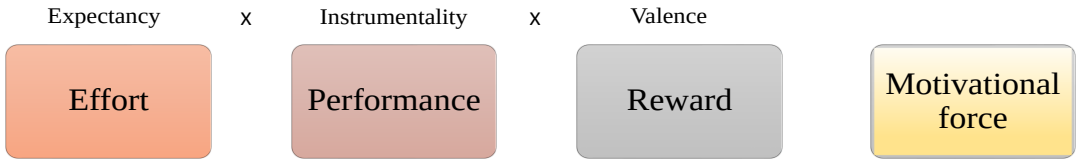


Figure 5. Expectancy Motivation Theory

While the Expectancy Theory of Motivation is most commonly applied in the literature from the employee or trainee perspective (Colquitt *et al.*, 2000), its structure allows for application from the employer perspective as well, though this is less commonly explored in empirical research. Theory's cognitive decision-making model is traditionally used to understand why employees choose to engage in training and how their perceptions influence learning behaviours and transfer outcomes (Chung *et al.*, 2022). However, the theory's core mechanisms are equally applicable to organisational decision-makers, such as employers evaluating whether to participate in a DLS. That is why, this idea can be implemented to understand the motivation of businesses (employers) that offer DLS. For example, managers

who focus on improving their workforce through continuous training, like using DLS, can expect increased competitiveness and reduced challenges in attracting high-quality employees (Expectancy). Businesses can look forward to various benefits when they deliver effective training by investing in DLS infrastructure and necessary resources. These may involve higher productivity, lower staff turnover, reduced costs related to retraining, hiring skilled workers, and other advantages of having a competent workforce (Instrumentality). If managers determine that the benefits outweigh the effort, they are more inclined to utilise DLS by committing their resources (Valance). Since this research aims to explore the motivation of businesses to choose DLS over ad-hoc/traditional training methods, this framework specifically pertains to businesses that have adopted DLS.

While limited, some research highlights the potential of Expectancy Theory to explain organisational motivation. For instance, Renko, Kroeck and Bullough (2012) and Hsu, Shinnar and Powell (2014) used Expectancy Theory to examine entrepreneurial motivations, expanding its scope beyond traditional employee contexts to include business founders' strategic decisions. Similarly, Walter and Mueller (2015) employed this theory to explore individual training decisions, which can be conceptually extended to organisational decision-making, especially in contexts involving investment in human capital. Chung *et al.*, (2022) also noted that contemporary training motivation theory includes situational and organisational variables that can influence training engagement, further supporting the relevance of expectancy-based models to broader contexts. Finally, Kopf (1992) argued, Expectancy Theory's force and choice models explain both direction and intensity of behaviour, offering a comprehensive middle-range theory capable of interpreting different levels of decision-making, including organisational choices about training engagement. The use of the theory from employers' (in our case, businesses') perspective provides a new lens through which employer in DLS engagement. By doing so, the research contributes to expanding the application of Expectancy Theory, showing that it can be a valuable tool not only for understanding individual trainee behaviour, but also for analysing employer-level decisions regarding engagement in workforce development initiatives.

2.8 Practice satisfaction as a key component of program effectiveness

As a subjective evaluation, student satisfaction with practice encompasses a broad spectrum of outcomes and experiences derived from educational settings. This satisfaction is pivotal for indicating the overall quality of the practice organisation, as it reflects on both theoretical

learning and workplace experiences. For example, Liddell *et al.* (2023) emphasise the importance of clear communication, efficient organisation, and support systems to improve student experiences. They propose that well-organised programs meeting student preferences can result in increased satisfaction with the apprenticeship. The role of mentor support, training site atmosphere, and interpersonal connections in shaping positive learning encounters at work highlights the necessity of arranging workplace learning to align with student preferences (Montalbo, 2022). In developing nations, the satisfaction of vocational high school students with their educational experience has been positively associated with their employability development (Sulistiobudi and Wijayanti, 2019). This indicates that a positive school environment can better prepare students for the workforce. Despite enhancing personal and job-related skills through dual training programs, a lack of in-depth theoretical knowledge acquisition in the workplace and limited collaboration between schools and workplaces reveal a gap in meeting student expectations and preferences, potentially impacting satisfaction (Poortman *et al.*, 2014).

Student satisfaction has also been found to be one of the most important factors in empirical studies measuring the effectiveness of apprenticeships. Brinia *et al.* (2018) analysed the effectiveness of Greece's apprenticeship in developing skills and contributing to trainees' employability. Graduates who participated in the survey indicated their contentment with the expertise and social abilities they gained throughout their university studies, as well as with the work setting, which served as a conducive learning space facilitating the shift from education to employment. Smith and Wilson (2003) investigated the effects of Australian apprenticeships and traineeships on learning and training. Results showed high satisfaction among students with their jobs if supervisors closely observed them, worked with adults rather than with other teenagers, and were assigned greater responsibilities than ordinary part-time students. A study conducted by Gow *et al*. (2008) examined the individual processes involved in the decision-making process that leads male apprentices to remain in the apprenticeship. Apprentice experiences towards apprenticeship were one of the domains where satisfaction revealed could predict the thoughts of apprentices about remaining in apprenticeships. Forster-Heinzer *et al.* (2016) found that training satisfaction was an important factor in determining the intention to remain in the learned occupation in Switzerland. Similar results gave a study on the effectiveness of the dual system of vocational training program in Taiwan, revealing a positive correlation between students' satisfaction with their learning and internship

experiences and their intentions to remain at their current jobs, thereby suggesting that student satisfaction can significantly reduce youth unemployment (Liu, 2021).

Although the studies listed above show high student satisfaction with the apprenticeship program, the results cannot be generalised due to the educational settings of apprenticeship programs that differ from county to country (Wolter and Ryan, 2011; Deissinger, 2015; Horn, 2016). Thus, the results should be considered individually, considering economic factors, education systems and labour market regulations. In addition to that, the results of previous research could be generalised only for those who were currently undertaking an apprenticeship (Smith and Wilson, 2003; Deissinger, 2015; Liu, 2021), for those who have a few months before termination (Forster-Heinzer *et al.*, 2016) or for graduates only (Brinia, Stavropoulos and Athanasoula-Reppa, 2018). The effectiveness of apprenticeship programs was mainly compared with previous research (Smith and Wilson, 2003). Although Xu (2013) examined the labour supply in science, technology, engineering, and mathematics (STEM) and non-STEM fields from the perspective of college graduates, the tested approaches had nothing in common with apprenticeship programs. Unlike earlier studies, we aim to study DLS performance from students' perspectives by comparing the experiences of current and former students in dual and non-dual forms of education to provide valuable insights into the satisfaction with two different training approaches.

2.9 DLS and its influence on career prospects

Dual learners (students and graduates) are more likely to be hired during the practice period and more likely to remain in the trained company or industry following graduation than non-dual learners (Billett, Choy and Hodge, 2020). Due to the high rate of youth unemployment and staff shortages in the industry, the intentions of dual students and graduates to remain in the trained company/industry after graduation can be regarded as a good performance of the DLS implementation. Although dual companies cannot offer job placements to all graduates, gained work experience allows dual graduates to stand out from the crowd and obtain placements in other companies in the same field. Nevertheless, students and graduates may decline job opportunities aligned with their specialisation and pursue careers in other (different) industries. Identifying the factors influencing the decisions of young individuals is essential to understanding how the DLS performs in managing issues such as youth unemployment and staff shortages.

Examining the quitting intentions and/or career choices of learners was covered in studies from a variety of aspects. Nielsen (2016) conducted interviews with apprentices and found that 40 per cent of Danish VET students dropped out of the system, providing a deeper look at student engagement as a key reason behind this issue. Donkor (2012) interviewed Ghana apprentices who had already left their programs to determine their true motivation for quitting and found that dissatisfaction with the workplace is a key reason for dropping out. Researchers who employed statistical models also considered satisfactional variables as central reasons for discontinuing the program. Liu (2021) examined learning experiences and found positive correlations between learning satisfaction and intentions to stay at the current job in Taiwan's dual education system. Holtmann and Solga (2023) examined dropout and stopout patterns in German VET and also revealed that performance-related factors and satisfaction with training led to stopouts or occupational changes. Some studies focused on one specific factor. For example, Seidel (2019) investigated whether having a second job influences the inclination of apprentices to quit their training and concluded that apprentices who needed a second job to cover their living costs were more likely to have the intention to quit their apprenticeship in Germany. Detailed demographic characteristics were tested by (Laporte and Mueller, 2013), who identified that completion of German apprenticeship programs positively relates to marriage and high school education. Finally, Beckmann (2023) delved into the gender reasons behind German apprenticeship attrition and found that especially males in female-dominated occupations are more likely to drop out of their apprenticeships compared to their majority peers.

The literature above and other related studies (Gow *et al.*, 2008; Bessey and Backes-Gellner, 2015; Smyth and Zimba, 2019; Wydra-Somaggio, 2021) mostly address the factors that influence the decisions of apprentices to quit the program rather than pursue specific career paths following graduation. The structure and availability of apprenticeship programs can differ based on the educational system of a country and specific industry needs (Carr-Chellman *et al.*, 2007). Apprenticeship systems in countries with deep historical roots, such as Germany and Switzerland, have well-established direct employer involvement, where students access apprenticeship directly through the employer for a particular position (Masdonati, Lamamra and Jordan, 2010; Dummert, 2021). This makes a study on stopping or dropping out more relevant in this instance. Adopted models, such as DLS in Kazakhstan, however, rely on educational institutions and government regulations to facilitate employer involvement (Alshynbayeva *et al.*, 2016). Apprenticeship completion, in this case, may mean

apprentices have to deal with the agreement and academic tasks to fulfil graduation criteria, which can complicate quitting and make it more relevant to examine intentions after graduation. In addition, some promising dual learners may be hindered by a lack of job opportunities and capacity within training companies after graduation. Still, their recognised work experience is supposed to smooth their transition to different employers in the same industry, which should also be considered when investigating trainee career intentions.

While some studies have investigated the intentions of learners in various educational settings, they were not specifically focused on apprenticeship programs (Nguyen and Taylor, 2003; Law, 2010; Lee and Chao, 2013; Xu, 2013). Research on assessing factors influencing the career intentions of apprentices explored several possible options for apprentice career intentions (Werwatz, 2002; Wagner and Wolf, 2013; Forster-Heinzer *et al.*, 2016; Billett, Choy and Hodge, 2020; Dummert, 2021) has often lacked a systematic approach to constructing satisfaction variables. Despite existing research on the influence of training quality (Liu, 2021; Wydra-Somaggio, 2021), job satisfaction (Werwatz, 2002; Wagner and Wolf, 2013; Smyth and Zimba, 2019; Dummert, 2021; Holtmann and Solga, 2023), and motivational factors (Werwatz, 2002; Gow *et al.*, 2008; Donkor, 2012; Forster-Heinzer *et al.*, 2016), the formulation of satisfaction variables has often been inconsistent across studies, ignoring a particular systematic method. Consequently, it is difficult to compare findings across research efforts, limiting the ability to draw effective conclusions about factors affecting the career intentions of learners.

2.10 Summary

DLS denotes the concept of vocational education pathways' duality and integrates academic instruction with practical training, allocating training hours between educational institutions and training workplaces. Despite diverse variations in the VET system, where some programs provide additional educational opportunities beyond formal education frameworks, DLS functions within the VET framework by formal education standards.

The DLS emerged in Germany and can be traced through distinct stages, originating from the Middle Ages when apprenticeships were first established for craftsmen. Today, the German DLS offers more than 300 recognised training programs in close partnership with business representatives, allowing them to prepare staff that meets labour market requirements and reduce youth unemployment. This system gained popularity worldwide, making Kazakhstan implement German-originated DLS in its vocational education system, as all

involved parties in DLS could benefit from collaborative efforts. This transition to a new approach has encouraged educational institutions to review their programs, focusing more on work-based training with practical hours and recognising those practical hours as a work experience, making a major distinguishing characteristic of DLS from traditional education. The government has officially recognised DLS status in the law, offering operational guidelines for all involved parties. New NQS started to define the knowledge and skills needed by professionals.

Different studies tried to explain the reasons (theories) to understand why businesses allocate resources to general skills given through the DLS. However, they did not provide a foundation towards understanding genuine motivations or processes in decision-making to invest in training. That is why this study utilises the Expectancy Motivation theory, which serves as a solid conceptual background to understand the motivation of businesses and their expectations for DLS involvement. It also may uncover the primary issues in the industry that led employers to participate in DLS and to gain insights into organising workplace training and positive changes in the involvement aligned with participation goals.

From the learners' side, many studies also explored learners' intentions in various educational settings, but few have specifically focused on apprenticeship programs. Research on factors influencing apprentice career intentions often lacks a systematic approach to constructing satisfaction variables. Despite existing research on study and training quality, satisfaction variables have been inconsistently formulated across studies, making it difficult to compare findings and draw effective conclusions on the performance of particular DLS programs.

Chapter 3. Methodology

3.1 Introduction

This Chapter begins with the working program, outlining a clear distinction between the two parts (quantitative and qualitative) of the research and the analysis employed in this study accordingly. The Expectancy Motivation Theory unfolds the research framework for using qualitative research conducted on businesses with a detailed explanation of the process of reaching out to respondents. It explains how data collection was organised through the FDGs to understand the perceptions and motivations of businesses. Then, it describes how the collected data was analysed using the NVivo tool. Quantitative research conducted on students employed Kirkpatrick's Learning Evaluation Model as a tool for the construction of a survey. While the full model consists of four levels, this research focuses only on Level 1 – Reaction, to assess learners' satisfaction with the practice experience. This Chapter also explains in detail how data collection from students was organised and analysed using statistical tests, such as the Mann-Whitney U and Kruskal-Wallis tests, to study satisfaction levels and their differences within the dual and non-dual groups and MNL model to study factors influencing dual and non-dual learners' intentions, in their respective sections.

3.2 Research working program

A quantitative research method is used to examine the performance of DLS from the perspective of learners, while a qualitative research method is used to examine the performance of DLS from the perspective of businesses. The *Figure 6* illustrates the working program with a clear distinction between both involved actors and applied methodological techniques. Later sections of this chapter will examine each method in greater detail.

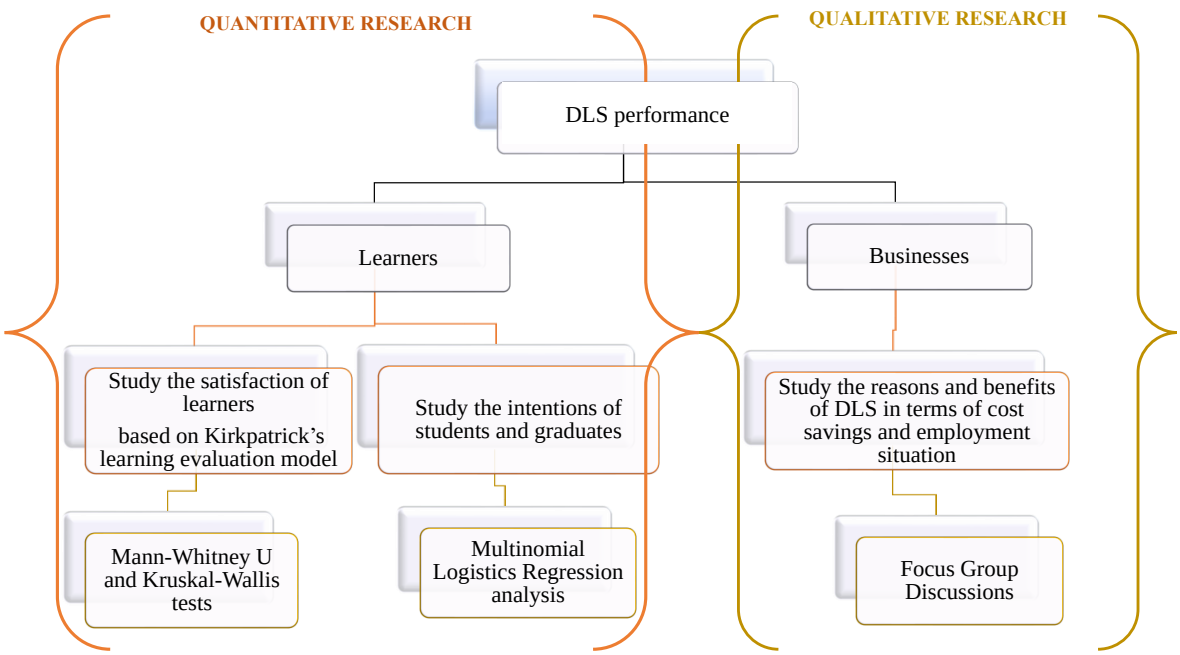
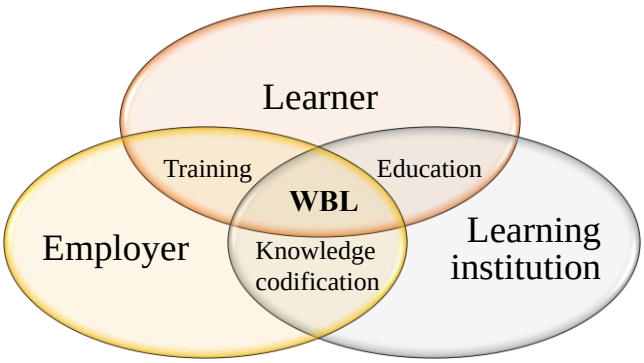


Figure 6. Research working program

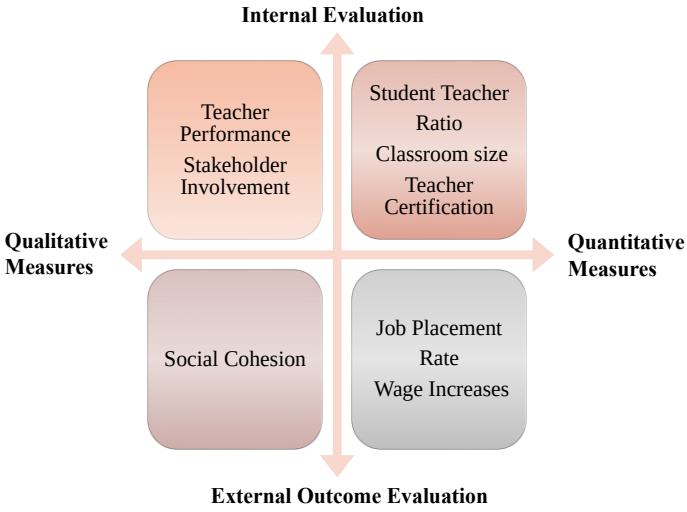
3.3 Methodological and conceptual background of qualitative research

Businesses in DLS are interested in gaining qualified personnel and, thus, actively participate in training and organising an effective workplace (Valiente and Scandurra, 2017; Davoine and Deitmer, 2020), including providing a place, purchasing equipment (devices) for students, allocating training places and facilities, organising exams, developing a curriculum, recruiting students and incur other costs associated with practice organisation (Gambin, Hasluck and Hogarth, 2010). Students engage in practical processes as well, gaining the opportunity to work in authentic production or other professional settings (Wydra-Somaggio, 2021). This experience allows them to absorb the corporate atmosphere and assess the adequacy of their practical training skills, which, in turn, may enhance academic performance and ensure the desired placement after graduation (Pogatsnik, 2018; Kocsis and Pusztai, 2021). Therefore, a study on the DLS performance serves as a valuable tool in ensuring that the new training approach meets the educational needs of Kazakhstani students while aligning with the practical requirements and objectives of businesses (Davoine and Deitmer, 2020). Performance apprenticeship assessment is a multifaceted process that extends across different levels and involves various methods, encompassing a network of the main involved parties such as learners, businesses, and educational institutions (Fretwell, 2003; Deitmer and Heinemann, 2009; Bajgar and Criscuolo, 2016) (*Figure 7*). *Figure 7* illustrates the work-based

model (WBL) of Edmunds (2007), where the involvement zones of three independent parties are specified.



*(a) (Fretwell, 2003)*Collectively



(b) (Edmunds, 2007)

Figure 7. (a) Work-based model and (b) Evaluation measures

The evaluation of training effectiveness resulting from the direct engagement of businesses might be conducted most effectively when viewed through the lens of the employer (Rowe *et al.*, 2017). Bajgar and Criscuolo (2016) Introduced a framework aimed at enhancing understanding of education and training outcomes that included "evaluation of the impact on employers" as an independent component. That means, program effectiveness does not necessarily require a collective analysis involving students, employers, and educational institutions simultaneously. Instead, it can be effectively conducted by focusing on a single stakeholder group, such as employers, thus allowing for a more targeted and detailed understanding of their specific motivations, experiences, and perceived outcomes.

Current research used the Expectancy Motivation theory by Vroom, Porter and Lawer (2005) as a conceptual background to comprehend the motivation of businesses and the related expectations that prompt their involvement in DLS. The practical implementation of the conceptual framework with research questions is illustrated in *Figure 8.* In order to comprehend the driving motivation behind businesses' dedication to DLS, the primary research question emphasises the key reasons why managers conduct training and the anticipated benefits from DLS involvement (RQ1). It will help to explore the motivations of employers and the full range of perceived benefits of engaging in DLS. These may include not only economic or employment-related outcomes, but also non-monetary and strategic benefits such as improving corporate image, fulfilling social responsibility obligations, or strengthening collaboration with educational institutions etc (Fretwell, 2003). In relation to the potential advantages of participating in DLS, this research will investigate whether managers view DLS as a comparatively cost-effective means of acquiring skilled personnel (RQ2). Thus, this question specifically targets perceptions of cost-effectiveness. It seeks to examine whether employers perceive DLS as a financially justifiable investment in comparison to ad-hoc/traditional training approaches. The improvement in employment situations, such as the reduction of employee turnover and recruitment of professionals, may serve as indicators of how businesses assess the favourable outcomes of training investments and stimulate participation in DLS (RQ3). The examination of motivations for adopting DLS through the exploration of its perceived benefits will offer insights into the overall value of DLS as a strategic approach to recruiting qualified professionals.

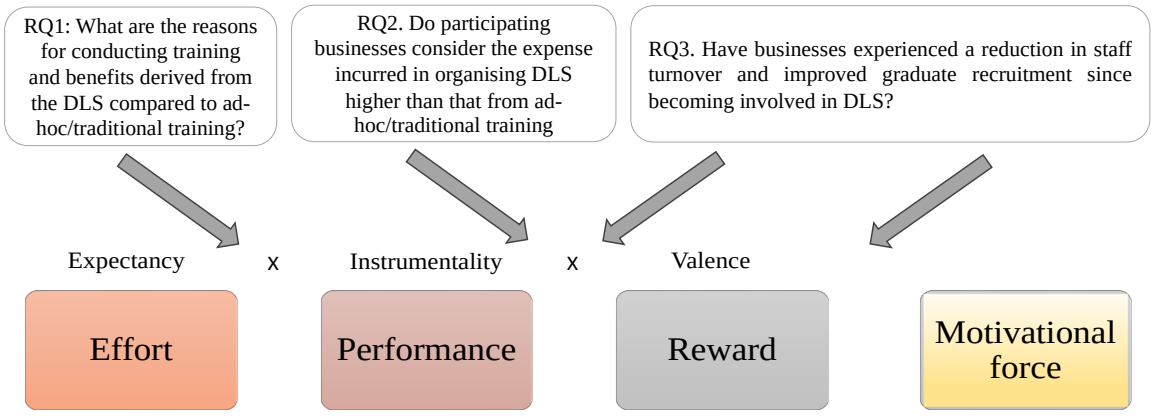


Figure 8. Practical implementation of the conceptual framework with research questions

3.4 Focus Group Discussions conducted with businesses

This study conducted semi-structured FGDs by dividing participants into two groups: dual and non-dual agri-food businesses of different sizes (Krueger and Casey, 2015). This approach offers diverse business perspectives and stimulates discussions between employers experienced in work-based practices (Bajgar and Criscuolo, 2016; Sauli, Wenger and Berger, 2021). This diversity provides a range of insights not easily captured through other methods (Krueger and Casey, 2015). Researchers (Rowe *et al.*, 2017; Smyth and Zimba, 2019; Howe *et al.*, 2023) have found this method valuable for in-depth exploration of work-based program effectiveness, including outcomes of training programs and challenges related to recruitment and retention in the company or industry. FGDs can also uncover group dynamics, consensus, benefits, and common issues in DLS implementation that require attention (Farnsworth and Boon, 2010; Lalioti, 2019).

Eligible dual businesses were identified from the data published by NCE about businesses participating in the DLS (NCE, n.d.). The selection of non-dual businesses was coordinated in collaboration with educational institutions that have contracts with businesses offering ad-hoc/traditional training.

This study concentrated on 1999 non-dual and 120 dual agri-food businesses identified in the Akmola region. Given the implementation of DLS in 2012, which allowed businesses to join at any given time, our focus was on businesses offering training for a minimum of three years or more, with the exclusion of those lacking contracts with educational establishments and training fewer than five students annually. To prevent biases during the investigation, a random sampling method was utilised for businesses of various sizes that fulfilled the aforementioned primary criteria. The selection process for this stage was carried out by representatives from the NCE and educational institutions.

Ethical approval was obtained from the Ethics Committee of the School of Agriculture, Policy, and Development at the University of Reading, UK, on July 14, 2022, under reference number 001922. Right after receiving approval, fifty-three official letters were distributed to potential employers to invite for FGDs, and 19 businesses responded positively. *Appendix A* illustrates descriptive information about businesses that participated in FGDs, including types of activity, employee numbers and assigned reference numbers. Businesses covered a variety of agricultural and food-related operations, such as the cultivation of cereals and crops, the manufacturing of bread, the practice of veterinary medicine, the processing and conservation of poultry meat, the production of fertilisers, as well as the breeding of cattle and horses.

I was in Kazakhstan during the organisational and data collection process. So, I was responsible for all organisational procedures (selection of participants, personal calls, distribution invitations, and information letters), conducting focus group interviews, and data collection and storage. In order to ensure the protection of the privacy of respondents, strict measures were implemented. No names, email addresses, or other personal details were utilised in any reports. The discussions were maintained in strict confidentiality. Audio recordings were exclusively accessible to me and my supervisors. These recordings were securely transferred to my personal password-protected computer, with access limited to myself and my supervisors, and were not shared with third parties. Furthermore, participants were assured the right to recall their responses if they wished to do so. This option remained available for a duration of three weeks after the meeting. To initiate the withdrawal of their contribution from the results, participants needed to contact me and provide their invitation letter.

The group discussion involved 19 businesses overall: 11 dual and 8 non-dual businesses working with colleges (9 businesses) and universities (10 businesses). *Figure 9* demonstrates the division of focus groups (FG) for businesses collaborating with colleges (FG1 and FG3) and businesses collaborating with universities (FG2) to enhance the alignment and interpretation of findings. The interviewed businesses consisted of two large enterprises, six medium-sized enterprises, and eleven small enterprises in terms of participant size[3] (KazData, n.d.).

Three meetings were conducted on different days each. The FG1 and FG2 took place in the conference room of S. Seifullin Kazakh Agrotechnical Research University, located in Astana city. Due to the challenges some business representatives face in travelling the city, the FG3 was held on the farm in Enbek village, Akkol district, Akmola region. Each group had a specific number of participants: the first focus group had 7 participants (5 dual, 2 non-dual), the second focus group had 10 participants (5 dual, 5 non-dual), and the third focus group had 2 participants (1 dual, 1 non-dual). The duration of participation for each group was set at 2 hours. In order to minimise group dynamics, the facilitator promoted open and inclusive communication among all participants to reduce conflicts and encourage positive dialogue by ensuring that everyone had the opportunity to voice their opinions (Farnsworth and Boon, 2010).

[3] Entrepreneur Code of the Republic of Kazakhstan (2015) classifies businesses based on employee numbers: large (more than 251 employees), medium (51-250 employees), and small (up to 50 employees).

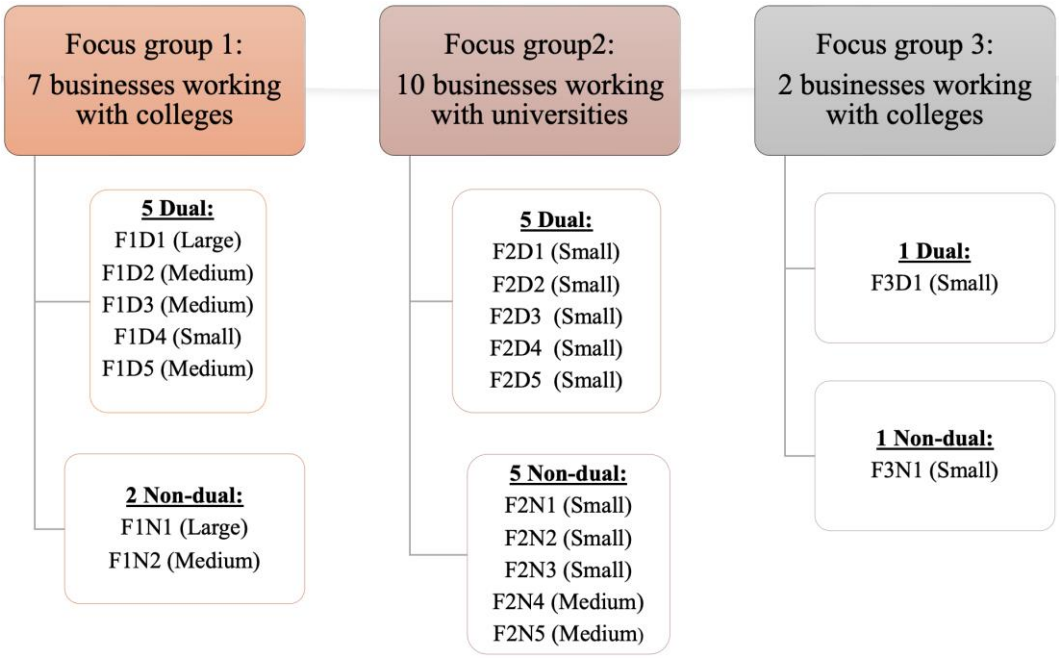


Figure 9. Focus group distribution

3.5 FGD questions and their analysis

FGD questions are designed to systematically explore various aspects related to the experiences and perceptions of participants with the DLS and ad-hoc/traditional training (thus, dual and non-dual). Questions for FGDs were semi-structured and included key questions about why businesses engage in dual and non-dual training and their views on cost savings with both approaches and the enhancement of the employment situation, such as turnover and hiring specialists (*Appendix B*).

The design and structure of the FGDs questions were guided by methodological literature on qualitative research. Specifically, this research drew on the practical frameworks and methodological recommendations provided by Krueger and Casey (2015) and Farnsworth and Boon (2010) for structuring focus group sessions, question sequencing, and analysing group dynamics. Following their guidance, the FGD questions were designed in a five-part structure. 1. Opening questions are used to facilitate the introduction of the respondents to one another and to make sure they are aware of the various participants, including those engaged in the DLS and those who are not. 2. Introduction questions focus on particular elements of the employment situation that businesses may be facing, such as a lack of skilled staff, high employee turnover, or other factors that could lead to participation in the DLS or arranging ad-hoc/traditional training. 3. Transition questions encourage participants to reflect on the decision-making process, challenges faced, and the overall experience. 4. Key questions form the core of the discussion, centring on the advantages that businesses may gain from DLS or

ad-hoc/traditional training. These questions explore whether there are noticeable shifts in employing skilled professionals, decreasing turnover rates, recruiting trained graduates, cutting costs, and understanding if businesses perceive the costs as justified in their efforts. 5. Ending questions wrap up by inquiring about the help or backing required from governing bodies in DLS delivery and growth, along with suggestions to enhance enterprise involvement in the DLS. Questions were further refined using empirical studies that employed focus groups to examine apprenticeships and employer training. Howe et al. (2023) and Pogatsnik (2018) informed the sequencing and thematic focus of the questions, highlighting employer motivations, barriers, and the role of collaboration in dual education. Helper et al. (2016) and Hernández-Lara et al. (2019) contributed insights on cost-benefit analysis and innovation potential, while Smyth and Zimba (2019), drawing on a social exchange perspective, provided valuable context on factors influencing apprenticeship completion and retention. Collectively, these studies shaped the development of key questions on strategic benefits, internal capacity development, and training outcomes relevant to the Kazakhstani agri-food sector.

This study used thematic analysis concepts to analyse data, which is a commonly used approach in qualitative research that involves identifying and analysing patterns or themes within data (Thompson, 2022; Cernasev and Axon, 2023). Since this approach is comprised of six steps, this research conduction attempted to follow every stage (Braun and Clarke, 2013). The initial step involved gaining acquaintance with the data that was gathered by means of manual transcription (Squires, 2023). The process involved translation from Kazakh and Russian languages into English. This is followed by coding using the NVivo 12 tool (Dhakal, 2022), where meaningful units of data are identified and labelled.

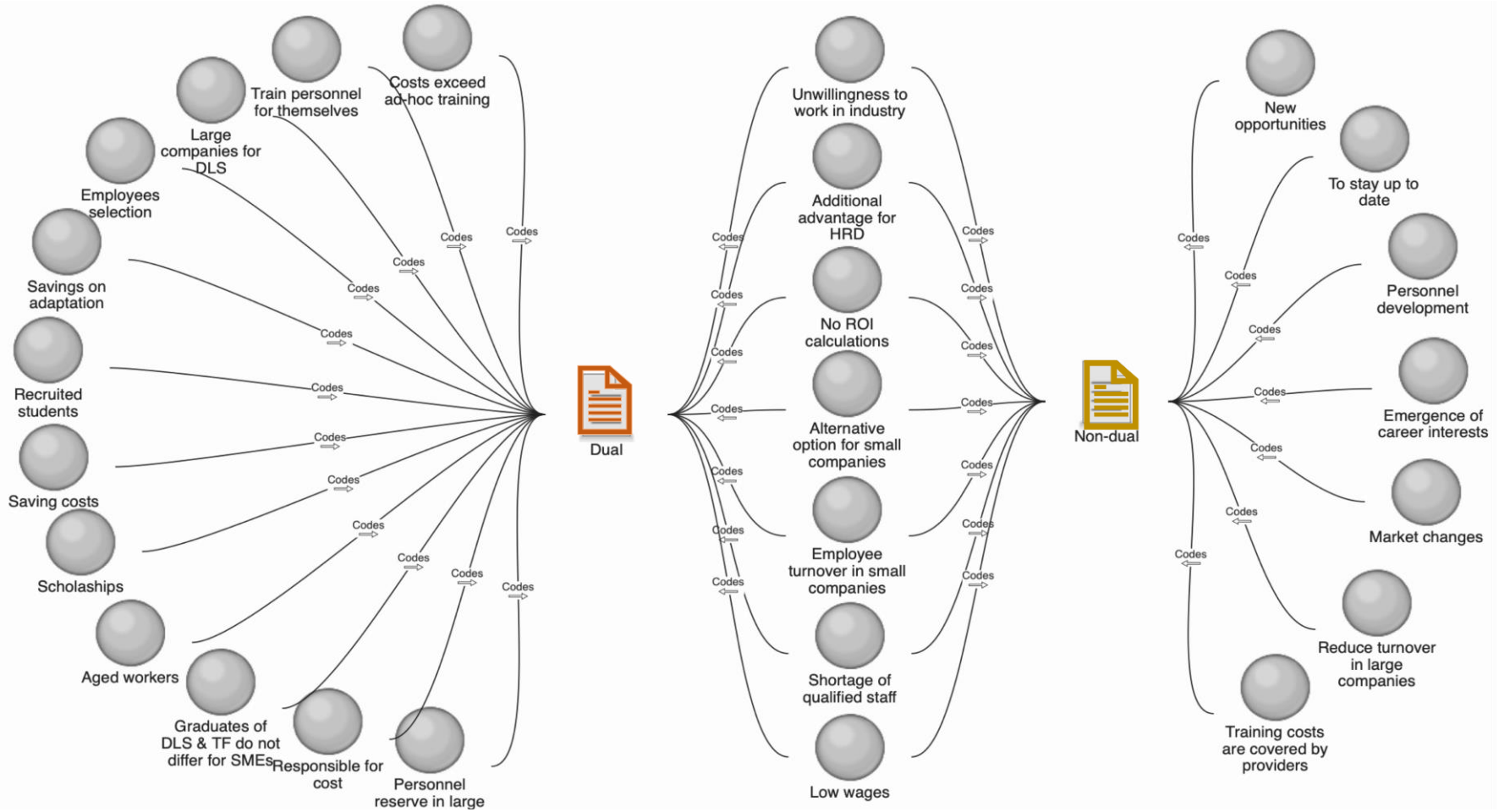


Figure 10. NVivo Comparative Chart

Since interview answers include both dual and non-dual companies, projects were generated to make comparisons between the groups easier. Then, similar codes were categorised together to create themes and were assigned names, which facilitated the results extraction. (Braun and Clarke, 2013). Lastly, the Comparative Chart (*Figure 10*) was created to compare the dual and non-dual categories, discern common indicators among the groups, and pinpoint distinctive items. Leveraging the 'Expand' feature allowed us to delve deeper into each response of businesses for a more thorough examination.

3.6 Kirkpatrick model as a tool for learning satisfaction assessment

To examine the satisfaction level with the DLS from students and graduates, this study uses Kirkpatrick's (1959) training evaluation model, which was initially introduced in 1959 and assessed both formal and informal training. The model consists of four sequential levels, each building upon the previous, to provide a comprehensive view of training effectiveness . These levels are (Kirkpatrick and Kirkpatrick, 2016):

Level 1: Reaction. This level measures participants' initial reactions to the training, including satisfaction, engagement, and perceived relevance. It focuses on learners' feedback on the training experience, such as whether they felt the training was valuable, well-organised, and applicable to their future work.

Level 2: Learning. This level evaluates the extent to which participants acquire intended knowledge, skills, or attitudes during the training. It typically involves assessments, quizzes, or practical tasks to determine knowledge gains or skill development.

Level 3: Behaviour. This level assesses whether participants apply what they learned once they return to the workplace. It requires observation or follow-up interviews to determine changes in behaviour or performance after training.

Level 4: Results. The final level measures the ultimate impact of training on organisational goals, such as improved productivity, reduced turnover, better quality of work, or increased customer satisfaction. This level links training outcomes to measurable business or institutional improvements.

Table 5. Questions for evaluating reactions of learners to the DLS and their relation to Kirkpatrick's Model

	Dimensions	**Questions adapted to examine DLS/ practice at the workplace**	**Reaction (Level 1) – Questions of Kirkpatrick's learning evaluation model** (Kirkpatrick and Kirkpatrick, 2016)
Favourability The degree to which participants are satisfied with the training	Practice Satisfaction	How satisfied are/were you with the dual learning in the organisation as a whole?	Did the trainees like and enjoy the training?
	College/University satisfaction	How satisfied are/were you with the training in the College/University as a whole?	
	On the Job Study	Are you satisfied with the quality of teaching in the workplace?	
	Study quality in the College/University	How satisfied are/were you with the teaching and learning quality in College or University	
	Study materials	Evaluate the provision of educational and methodological material	Did the content and material make sense to them?
	Supervision	How satisfied are/were you with the support of the company's mentor (head of the practice)?	Was the leader (trainer) knowledgeable, credible, and helpful?
	Practice expectations	Did/Does practice meet your expectations?	Did you feel that the training was worth your time?
Engagement The degree to which participants are actively involved in and contributing to the learning experience	Equipment	Rate the usage opportunity of necessary equipment and technology in the practice workplace (for example, during preparation for your assignments)	Perceived practicability and potential for applying the learning
	Participation	Do/Did you actively engage in activities and tasks related to your role and responsibilities?	Were the training activities engaging? (Or the level of participation)
Relevance The degree to which training participants will have the opportunity to use or apply what they learned in training on the job	Practice Application	Have you been or are you able to apply the theoretical knowledge you gained in college into practice consistently and logically?	

The goal-oriented approach demonstrates Kirkpatrick's evaluation and has been identified as particularly suitable for appraising career aspirations concerning satisfaction with training (Smidt *et al.*, 2009). In contrast to system-centred evaluation, which predominantly

concentrates on organisational measures, or responsive evaluation, which heavily depends on actual requirements, emphasising inclusivity and pertinence, the goal-oriented approach furnishes a methodical framework that corresponds with the aims of training schemes (Wanjiku, Mairura and Place, 2010). For businesses, the primary objective of implementing DLS may revolve around acquiring proficient experts, whereas for students, it could involve securing employment. Existing goal-based training methods (Warr, Bird and Rackham, 1970; Kaufman, Keller and Watkins, 1996; Phillips, 2003) have integrated supplementary stages or adaptations within their assessment structures, including evaluating the context and RIO. Nonetheless, they all adhere to the fundamental principles of Kirkpatrick's model. This methodology is extensively utilised due to its efficacy in appraising training schemes across diverse sectors and conforming to various training settings, encompassing apprenticeship initiatives, such as DLS (Carr-Chellman *et al.*, 2007). Kirkpatrick's model assessments encompass a blend of rating scale components, and because of the general nature of the questions, many organisations employ identical question formats or modify them based on the training endeavour to ascertain the favorability, engagement, and relevance of the training (Alsalamah and Callinan, 2021).

This research utilises Kirkpatrick's training evaluation model at level 1 to develop satisfaction dimensions. According to Level 1 Kirkpatrick's model - 'Reaction' is the degree to which participants find the training favourable, engaging and relevant to their jobs" (Kirkpatrick and Kirkpatrick, 2016, p. 126). This level includes three parts. The first part – 'Favorability', measures the extent to which participants are satisfied with the training. It reflects the overall contentment of participants with the training program and whether they found it to be a positive and worthwhile experience (Quinton *et al.*, 2022). Second is 'Engagement' which assesses the degree to which participants actively participate in and contribute to the learning experience. It reflects how well the training program holds their attention and keeps them engaged in learning (Alsalamah and Callinan, 2021). The last part is 'Relevance', which examines their perception of the practicality of the training and whether they see opportunities to use or apply learned content in their daily work (Heydari *et al.*, 2019). *Table 5* demonstrates the adoption process of Kirkpatrick's Level 1 questions, showing their connection to the questions used in this study and the dimensions that were created.

3.7 A questionnaire conducted with learners

Primary data were gathered through online questionnaires to assess respondents' satisfaction levels with the DLS and the factors impacting their career decisions. Approval was obtained from the Ethics Committee at the University of Reading, UK, under reference number 001696, on November 4, 2021. Subsequently, a pilot survey involving 20 participants was conducted to address any potential issues concerning clarity, structure, and the submission procedure. This step was of particular significance due to the translation of the questionnaire into Russian and Kazakh, with the aim of identifying any language comprehension challenges during the survey. Upon receiving feedback and making necessary adjustments, the questionnaire was officially launched on the Qualtrics platform. A survey link was created and remained active from November 15, 2021, until the end of February 2022.

An online survey was disseminated to educational institutions in the Akmola region and Astana city, covering both dual and non-dual forms of education. The selection of these institutions was based on data provided by the NCE. The selection criteria for colleges and universities included participation in DLS and the presence of students (in their final year of study) and recent graduates specialising in agri-food disciplines. Official correspondence was initiated through email with the Administration Office of the ten colleges and two universities to request their support and engagement in the distribution of the questionnaire. Six colleges and one university responded positively, demonstrating their strong interest in supporting the survey.

Each school appointed a coordinator to oversee the distribution of the online questionnaire to students and graduates. While I was in the UK during the data collection, I maintained close communication with the school coordinators. Their role was limited to distributing the questionnaires online and did not extend to analysing the data. Importantly, they did not have access to the survey results or any personal respondent data.

No personal data, such as the names and email addresses of the respondents, was gathered, with the exception of details like date of birth, gender, marital status, and age. The date of birth was converted into a unique reference number to facilitate data analysis and respondent identification if needed. Participants were granted the option to retract their answers within a three-week period following submission by getting in touch with the researcher using their reference number. However, there have been no such requests thus far. All replies were promptly and securely stored in the Qualtrics database remotely upon completion of the questionnaire. The data was kept securely on a computer protected by a

password. These privacy measures were clearly conveyed to both the survey coordinators and the participants.

Table 6. Group of respondents by educational institutions

College/University	N/%	Groups of respondents				
		STF	GTF	SDLS	GDLS	Total
Agrotechnical College №10, Akkol city	N	14	2	12	5	33
	%, group	2.9	1.3	7.3	9.5	3.8
Agrotechnical College №6, Astrakhanka village	N	12	2	9	0	23
	%, group	2.4	1.3	5.5	0	2.7
Agrotechnical College №7, Esil city	N	36	9	58	6	109
	%, group	7.2	5.8	35.4	11.3	12.6
Agrotechnical college №12, Yegindykol village	N	5	0	30	16	51
	%, group	1	0	18.3	30.2	5.9
Agrotechnical college №2, Kamenka village	N	5	1	4	0	10
	%, group	1	0.6	2.4	0	1.1
Multidisciplinary College of Sh. Ualikhanov KSU	N	5	0	10	0	15
	%, group	1	0	6.1	0	1.7
S. Seifullin Kazakh Agrotechnical University, Astana	N	420	140	41	26	627
	%, group	84.5	91	25	49	72.2
Total	**N**	**497**	**154**	**164**	**53**	**868**
	%, group	100	100	100	100	100

In total, 918 responses were obtained from both dual and non-dual students and graduates. To ensure the reliability of the sample, incomplete surveys were omitted, resulting in the inclusion of 868 fully answered surveys as the study sample representing six agricultural colleges and one university and encompassing students of traditional form (STF), graduates of traditional form (GTF), students of DLS (SDLS) and graduates of DLS (GDLS) (*Table 6*).

The decision to include both students and graduates in the study was made to gain a more comprehensive understanding of the dual and traditional learning systems from different temporal perspectives. Students provide real-time insights into their ongoing experiences, expectations, and motivations, particularly regarding training quality and future intentions (Pogatsnik, 2018; Kocsis and Pusztai, 2021; Liu, 2021). In contrast, graduates offer retrospective evaluations of their entire training experience and its outcomes, including job placement, satisfaction, and career trajectory (Lalioti, 2019; Mulkeen *et al.*, 2019; Dummert, 2021). This dual perspective enables a more robust assessment of DLS effectiveness, particularly regarding satisfaction with practice and post-graduation decisions. Furthermore, the agri-food sector in Kazakhstan often recruits graduates directly from their training companies, making it crucial to assess whether students intend to stay in the sector and whether graduates actually did so. This mixed sample enriches the findings and adds depth to understanding how DLS impacts retention and recruitment in the industry.

The questionnaire had three sections (*Appendix C*). In the first section, respondents were asked about demographics, college and speciality details, and employment statuses. This section was designed to categorise respondents into four distinct groups: STF, GTF, SDLS, and GDLS. Further questions were related to their group category. Although questions for both TF and DLS were similar, they were meticulously created to ensure clarity for both groups. This was done considering that TF respondents might not be familiar with DLS terminology and vice versa.

In the second section, participants were queried about their reactions and perceptions on the organisation of the DLS or traditional training encountered in both the company and the academic institution. To determine the satisfaction level of learners, a 7-point Likert scale was employed. This scale presented seven potential responses to a statement or query, enabling participants to convey their positive (point 7) or negative (point 1) degree of agreement or perception concerning the statement on training experience.

In the last section, respondents were asked a series of questions regarding employer-provided initiatives and other motivational factors influencing their decision to work in a training company. Additionally, participants were asked to specify their chosen career path or the one they intend to pursue after graduation:

1. to remain with the company where they practised/practising (intentions to **REMAIN**);
2. to apply for another position in the same industry (intention to change the company, but in the **SAME** industry);
3. to find a position in the **OTHER** industry (intention to leave the sector).

3.8 A Mann-Witney U and Kruskal Walls tests

A Mann-Witney U (also known as the Wilcoxon rank sum) test is used to identify differences between satisfaction levels of two groups: dual and non-dual (Wilcoxon, 1945; Mann and Whitney, 1947). A normal distributed variable and an interval or ratio level measurement are required for an independent samples t-test, which is a test of two groups as well (McKnight and Najab, 2010). As our practice and study satisfaction dimensions do not satisfy the parametric assumptions of the t-test (ordinal variables based on ranking observations), it is preferable to use the Mann-Whitney U test to determine whether two samples come from the same population (MacFarland and Yates, 2016).

Ranks were assigned to the values from the full sample (both dual and non-dual groups pooled together) in descending order. The rank can then be used to generate a t-statistic. The smallest of the two calculated U values for both groups is identified after aggregating the ranks for each group (Călin and Tușa, 2023):

$$\cup_{dual} = n_1 n_2 + \frac{n_1(n_1+1)}{2} - R_1 \quad (1)$$

$$\cup_{non-dual} = n_1 n_2 + \frac{n_2(n_2+1)}{2} - R_2 \quad (2)$$

where R_1 and R_2 are the sums of the ranks and n_1 and n_2 are the number of participants in dual and non-dual groups, respectively. We use a critical value of .05 to identify statistically significant differences and exclude chance variations when identifying statistically significant differences (McKnight and Najab, 2010; Moralista and Oducado, 2020).

This study uses an independent sample Kruskal-Wallis test, which is widely used for comparing differences between groups, specifically when variables are not normally distributed and do not have the same variance (Obi, Eze and Chibuzo, 2022). This study evaluates differences between four groups - dual/non-dual students and dual/non-dual graduates, based on satisfaction variables which do not follow a normal distribution (Kruskal and Wallis, 1952). In addition to the Mann-Whitney U test, Kruskal-Wallis is used as an extension of this test to provide a nonparametric alternative to an analysis of variance (ANOVA) (McKight and Najab, 2010). Due to the non-normality of the variable, we are not able to compare group means; instead, we compare the sum of ranks R_i, which will be computed for each group, denoted by *k (1, 2,…n)*, of sample sizes n_i of the group *i*. Afterwards, the test statistic *H* will be calculated, representing the variance of ranks across groups (overall 6 groups[4]) (Hecke, 2012):

$$H = \frac{12}{N(N+1)} \sum_{i=1}^{k} \frac{R_i^2}{n_i} - 3(N+1) \quad (3)$$

$\frac{12}{N(N+1)}$ coefficient is a suitable normalisation factor (Ostertagová, Ostertag and Kováč, 2014), *N* - total size of the sample (Schmidt, 2010).

This distribution is closely related to the chi-square distribution regarding the variance between groups. *H* can be used to test null, and a chi-square table can be created with degrees

[4] Six pairwise comparisons were retrieved from the test. However, based on the research questions, this study focuses only on two of them: DLS students - TF students and DLS graduates – TF graduates.

of freedom equal to n - 1. If *H* exceeds a critical value, we may conclude that the two groups do not belong to the same population (McKight and Najab, 2010).

3.9 Multinominal logistic regression

To examine the effectiveness of DLS in terms of employability, this study examines the career intentions of participants. This research offers respondents to choose one of the three categories (y) without any evident hierarchical order: to **REMAIN** in the industry and with the employer they practised (y=R), to stay in the **SAME** industry but change the employer (y=S) and to leave the industry and apply **OTHER** work placements (y=O). In the context of research involving categorical dependent variables, the utilisation of ordinary least squares for the estimation of coefficients pertaining to independent variables is deemed inappropriate, and a more suitable approach involves the use of maximum likelihood estimators (Kwak and Clayton-Matthews, 2002).

This study finds the MNL a useful method to examine the relationship between various (satisfaction and demographical) factors and the employment intentions of students and graduates, particularly due to the utilisation of more than two dependent variables (three options of career paths) (Freese and Long, 2000). The fundamental premise has been extended from binary logistic regression (Kiliç, 2015). Unlike typical logistic regressions, the MNL model facilitates the prediction of response variables based on both continuous and categorical explanatory variables and serves various analytical purposes, including quantifying the portion of the variance in the response of the explanatory variables, establishing the hierarchy of importance among independent variables, evaluating interactions between variables, and comprehending the implications of covariate control variables (El-Habil, 2012).

This model is preferred by researchers not only for its computational simplicity but also because of its ability to demonstrate a superior capability to predict occupational distribution (Laporte and Mueller, 2013; Lee and Chao, 2013; Bessey and Backes-Gellner, 2015; Picchio and Staffolani, 2019).

As MNL can be considered the concurrent estimation of binary logits for all pairs of outcome categories (in our case, Remain=R, Same=S, and Other=O). However, it is not optimal because each binary logit is based on a different sample ($\frac{\Pr(R|x)}{\Pr(O|x)}$; $\frac{\Pr(S|x)}{\Pr(O|x)}$; $\frac{\Pr(R|x)}{\Pr(S|x)}$) (Freese and Long, 2000).

In our study, respondents make one career choice amongst the L > 1 alternatives they might choose. Their behaviour can be represented in terms of the polychotomous response

variable (in our case, y = R, S, O) (Shabbir and Mariano, 1993). That is why the MNL model can be written as:

$$ln\varphi_{m|b}(x) = ln\frac{\Pr(y = m|x)}{\Pr(y = b|x)} = x\beta_{m|b} \quad \text{for m=1 to L} \tag{4}$$

Where b is a base outcome or the reference category. As $ln\varphi_{b|b}(x) = ln1 = 0$, if follows that $\beta_{b|b} = 0$. That is, the log odds of an outcome compared with itself is always 0. Thus, the effects of any independent variables must also be 0. The probabilities will be the same regardless of the base outcome b that is used. Our study has three outcomes, and we fit the model with alternative 1 (R) as a base[5], so we obtain estimates $\beta_{S|R}$ and $\beta_{O|R}$, with $\beta_{R|R} = 0$. The probability equation of MNL for this study would be:

$$\Pr(y = m|x) = \frac{\exp(x\beta_{m|R})}{\sum_{j=1}^{L}\exp(x\beta_{j|R})} \tag{5}$$

The model calculates the probability of choosing a specific alternative (y) as a function of the characteristics of the factors influencing their choice (x) and the associated coefficients (β). Because some independent variables have three categories (for example, age and salary), it leads to an expanded equations set: 0.age, 1.age, 2.age or 0.salary, 1.salary, 2.salary, 3.salary:

$$\begin{aligned} ln\varphi_{S|R}(x_i) = {} & \beta_{0,S|R} + \beta_{1,S|R}\,1.age + \beta_{2,S|R}\,2.age + \beta_{3,S|R}\,gender + \\ & \beta_{4,S|R}\,1.salary + \beta_{5,S|R}\,2.salary + \beta_{6,S|R}\,3.salary + \beta_{7,S|R}\,promotion + \\ & \beta_{8,S|R}\,practice\ satisfaction + \beta_{9,S|R}\,employee\ initiatives + \\ & \beta_{10,S|R}\,study\ satisfaction \end{aligned} \tag{6}$$

$$\begin{aligned} ln\varphi_{O|R}(x_i) = {} & \beta_{0,O|R} + \beta_{1,O|R}\,1.age + \beta_{2,O|R}\,2.age + \beta_{3,O|R}\,gender + \\ & \beta_{4,O|R}\,1.salary + \beta_{5,O|R}\,2.salary + \beta_{6,O|R}\,3.salary + \beta_{7,O|R}\,promotion + \\ & \beta_{8,O|R}\,practice\ satisfaction + \beta_{9,O|R}\,employee\ initiatives + \\ & \beta_{10,O|R}\,study\ satisfaction \end{aligned} \tag{7}$$

All Likert satisfaction variables applied in the model were analysed using principal component analysis (PCA), which identifies recurring patterns within complex spectral datasets without losing valuable information (Beattie and Esmonde-White, 2021). By capturing the most

[5] More desired outcome as retention of learners and indicate the effectiveness of the DLS (Hassan *et al.*, 2013).

important variation in the data, PCA can reduce the dimensionality of high-dimensional compositional data and improve its interpretability (Milone, 2010).

Post-estimation tests were used to assess the validity and significance of the MNL model (Freese and Long, 2000). We first tested whether the inclusion of specific variables significantly improved model fit by applying the Likelihood-ratio (LR) test for each independent variable (Demidenko, 2020). In logistic regression analysis, both tests are commonly used to determine the relative importance of independent variables in the prediction of the outcome (Das, Dhar and Pradhan, 2018). If the hypothesis that does not affect the outcome is true, the difference between the full model (LR_f^2) and the restricted model (LR_r^2), formed by excluding the variable, is calculated as chi-square, with y-1 degrees of freedom: $LR_{r\,vs\,f}^2 = LR_f^2 - LR_r^2$ (Freese & Long, 2000). Conversely, the Wald test provides insight into the contribution of individual variables without requiring the estimation of additional models (Drton and Xiao, 2016; Hobza, Martín and Pardo, 2017). In general, both tests for combining categories yield remarkably similar results, although the LR test is preferred by many researchers (Freese and Long, 2000).

As a second step for post-estimation analysis, we also used LR in order to test the combination of categories and determine whether there were significant differences between the groups (Hosmer and Lemeshow, 2000). As we have three categories (y=Remain, y=Same. y=Other), we tested whether each category can be combined. The most conceptually justified combination was between "Same" and "Other", as both represent a departure from the original training company. Combining them would allow a contrast between those who remain versus those who exit, either partially (within industry) or entirely (outside the industry). This approach aligns with existing career decision literature (Freese and Long, 2000; Wagner and Wolf, 2013), often distinguishing between organisational and sectoral retention. In addition to this combination, we also tested merging: "Other" and "Remain" into a single category (leaving industry or staying with the same employer), compared against "Same," and "Same" and "Remain" into a single category (remaining in the agri-food sector), compared against "Other."

So, if LR_f is the likelihood of the full model with y categories, and LR_r is the likelihood of the reduced model with y-1 categories (where categories 'Same' and 'Other' are combined), the equation will be (Soon, 2009): $G = -2 \times \ln\left(\frac{LR_r}{LR_f}\right)$. G follows a chi-squared distribution with degrees of freedom equal to the difference in the number of parameters

between the full and reduced models. If G is significantly different from zero, it suggests that combining categories improves the model fit (Hosmer and Lemeshow, 2000).

Finally, the assumption of Independence of Irrelevant Alternatives (IIA) (Freese and Long, 2000) was analysed using the Hausman test or the LR test, which was first proposed by (McFadden, Tye and Train, 1977) and improved by Small and Hsiao (1985), and contributed to a comprehensive evaluation of the MNL model's robustness and adherence to the underlying assumptions. Defining the Hausman test in terms of IIA is as follows (Freese and Long, 2000):

$$H_{IIA} = (\widehat{\beta_r} - \widehat{\beta_f^*})'[\widehat{Var}(\widehat{\beta_r}) - \widehat{Var}(\widehat{\beta_f^*})]'(\widehat{\beta_r} - \widehat{\beta_f^*}) \quad (8)$$

A chi-square distribution of H_{IIA} with degrees of freedom equal to the rows in $\widehat{\beta_r}$ is asymptotically observed if IIA is true. When H_{IIA} reaches significant values, the IIA assumption has been violated.

For the computation of Small and Hsiao's test, the sample is divided into two random subsamples that are approximately equal in size. Both subsamples are fitted with the unrestricted MNL model and estimated using the restricted sample yielding the estimates $\hat{\beta}_r^{S_2}$ and the likelihood $L(\hat{\beta}_r^{S_2})$. The Small-Hsiao statistic is the difference (Freese and Long, 2000) of:

$$SH = -2\left[L(\hat{\beta}_u^{S_1 S_2}) - L(\hat{\beta}_r^{S_1 S_2})\right] \quad (9)$$

The $\hat{\beta}_r^{S_2}$ contains the estimates obtained from the unrestricted model and $\hat{\beta}_u^{S_1}$ contains estimates obtained from the unrestricted model of the second sample. According to the *SH* distribution, all independent variables have degrees of freedom equal to K + 1, where K is the number of independent variables.

3.10 Summary

This study utilises both qualitative and quantitative research methods. A qualitative research method was used to examine DLS performance from the perspective of businesses. We operationalised research questions to the main concepts of the Expectancy Motivation theory and utilised FGDs with dual and non-dual agri-food businesses. Overall, 19 businesses, 11 dual and 8 non-dual businesses, were involved in FGDs. FGD questions were aimed at investigating different facets concerning businesses' experiences and viewpoints on DLS and ad-hoc/traditional training. Questions were structured to understand the reasons behind businesses participating in both dual and non-dual training, their perspectives on cost-effectiveness associated with both training approaches and how they believe these methods contribute to improving the employment scenario, including aspects like turnover rates and

the recruitment of specialised professionals. All FGD answers were analysed using the NVivo 12 tool.

A quantitative research method was used to examine DLS performance from the perspective of learners. Kirkpatrick's training evaluation model (level 1) provided the theoretical framework for designing satisfaction dimensions as well as factors that could potentially influence post-graduation career decisions of learners: whether they remain with the same employer in the agri-food industry, change employers in the same industry or leave the industry. Evaluation is based on a multistage random sample of 651 dual and 217 non-dual learners. A Mann-Witney U was used to identify differences between satisfaction levels of two groups (dual and non-dual), while the Kruskal-Wallis test was used for comparing differences between groups, specifically when variables are not normally distributed and do not have the same variance. Multinomial Logistic Regression was used to examine the career intentions of both dual and non-dual groups after graduation. Post-estimation analyses were applied to assess the validity and significance of the MNL model.

Part II

This part provides results on DLS performance from a business and learners' perspectives. FGDs results uncovered motivations and experiences of businesses with DLS versus traditional training, while empirical results showed comparisons in satisfaction levels with practical experience between dual and non-dual learners and revealed factors influencing their career intentions after graduation.

Chapter 4. Agri-business perspectives on DLS performance

4.1 Introduction

This Chapter explores the perspectives of businesses on their motivations for participating in the DLS and assesses the advantages, specifically in terms of the perceived costs associated with the organisation of DLS and reduction in employee turnover, that businesses gain through DLS engagement relative to non-dual practices, such as ad-hoc/traditional training. Specifically, this Chapter answers to the following research questions:

RQ1. What are the reasons for conducting training and benefits derived from the DLS compared to ad-hoc/traditional training?

RQ2. Do participating businesses consider the expense incurred in organising DLS higher than that from ad-hoc/traditional training?

RQ3. Have businesses experienced a reduction in staff turnover and improved graduate recruitment since becoming involved in DLS?

This Chapter studies the performance and challenges of DLS and compares the perceptions of businesses involved in DLS (dual) with those using the traditional approach (non-dual). Despite section 2.5 of Chapter 2 providing distinguishing characteristics of dual and non-dual approaches in TVE, it is imperative to mention other training approaches that businesses use to train specialists that fall under the non-dual category of this research.

Traditional or non-dual education offers short-term practical training in workplaces for students (1-3 months) as part of classroom-based learning (Doskeyeva *et al.*, 2024). Training companies are less involved in the training process in this case and usually do not employ students during practice due to the short practice period. Work experience gained during the practice is a part of the study program and is not recognised officially.

Businesses also provide ad-hoc training for staff, which is informal and unsystematic in nature and will be classified as a 'non-dual' in this research (Muhambetaliev and Kasymova, 2016). Ad-hoc training focuses on meeting immediate, specific needs without a predefined plan and is often conducted on a short-term basis (Alsalamah and Callinan, 2021). Similarly to traditional practice, it involves less collaboration with educational institutions, with

employers choosing the content and volume of training (Rageth and Renold, 2017). Ad-hoc training does not lead to formal qualifications.

In contrast to the 'non-dual' approach, DLS (or 'dual') has a formal structure integrating classroom education with extensive workplace training that spans 2-3 years (Mukhamadeyeva, Mukhamadeyev and Mukhamadeyeva, 2015). This system fosters strong partnerships between educational institutions and businesses, jointly ensuring training quality and providing compensation during practical training (Alshynbayeva *et al.*, 2016). The business sector is deeply involved in developing curricula and supporting students who earn recognised qualifications with practical hours counted as work experience (Issayeva *et al.*, 2017). As DLS engagement requires substantive investment to organise training, Vroom's Expectancy theory (Vroom, Porter and Lawer, 2005) is used to underline the conceptual framework in conducting qualitative research to understand the motivational forces of the employers of agri-food businesses in their decision-making processes to engage in dual and non-dual training activities.

4.2 Reasons for conducting training and benefits derived from the DLS and ad-hoc/traditional training

Taking into account the 'Effort' concept in the Expectancy Theory, both dual and non-dual groups believe their training investment will develop personnel. Efforts of businesses towards investment in DLS are explained by qualified staff tailored to the specific needs of the company, which in turn may save costs on finding and selecting employees, their retraining, and the adaptation process. Examining the primary motivation for investing in DLS reveals underlying reasons for this motivation and underscores specific challenges within the agri-food sector.

A shortage of professionals available to hire was identified as the main reason dual and non-dual businesses need to provide training. According to dual businesses, a lack of qualified personnel is mainly caused by the *inconsistency* between educational institutions and market demands. F1D5 stated:

> …we believe that the knowledge given in colleges and universities does not correspond to what business expects. Therefore, the reasons for our participation in DLS are that we are personally interested in training qualified personnel in the field of mechatronics in agriculture in three areas: mechanics, electronics, and information technology…

Study findings, however, indicate another reason (*Figure 11* illustrates additional reasons for personnel shortage identified in the study) for the shortage of qualified specialists in the agri-food sector – the *ageing of staff* because of the unwillingness of young people to work in this sector:

> We will need more personnel in the next 5-10 years because many workers are over 50 now. Moreover, there is no replacement for them, and young people are not willing to take these positions (F3D1).

Despite the clear need for human capital in agriculture, businesses mentioned *a low salary rate*, which could be one of the reasons young people avoid working in this industry. For instance, F2N2 company stated:

> Today, salary is one of the most critical factors. Our starting pay rate is 100 thousand[6] KZT for people who come to us to work as laboratory assistants…The youth are willing to work with us but are leaving because we cannot offer them a decent salary…

Almost all businesses believe that DLS will bring them an influx of new young employees. Non-dual businesses emphasise the development of personnel and the emergence of career interest (N1D1), while dual businesses (for example, F1D2, F3D1, F1D5) note that the main advantage of participating in DLS for a company is the opportunity to train personnel for themselves, saving on the costs of finding and selecting employees, their retraining and adaptation:

> Training shows us who will be good employees and remain in the company. Selection is already underway. Hiring someone from outside is risky. This is where we prepare our staff for ourselves.

[6] 1 KZT (Kazakhstani tenge) = 0.00199 EUR (*National Bank of Kazakhstan*, no date)

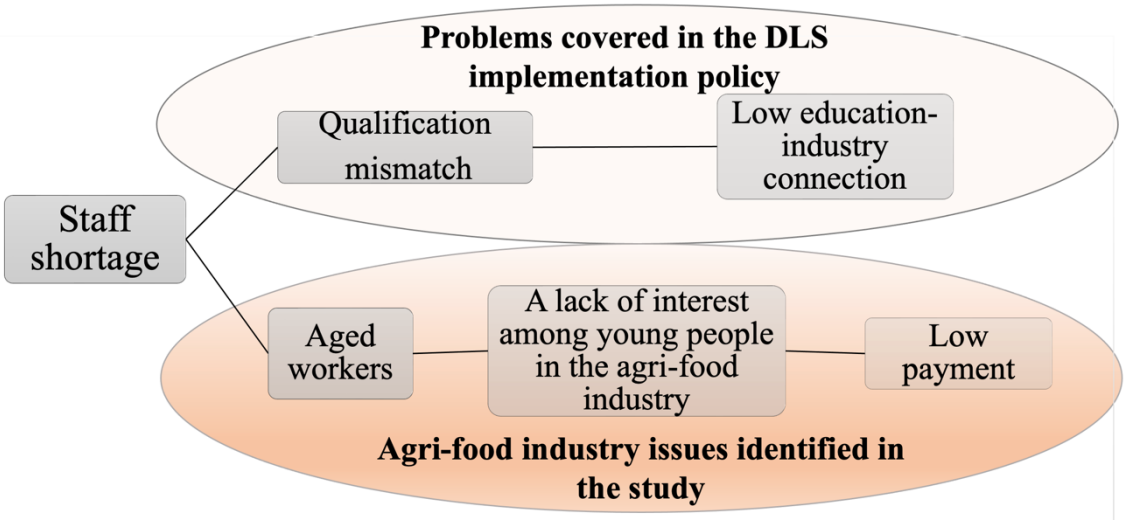


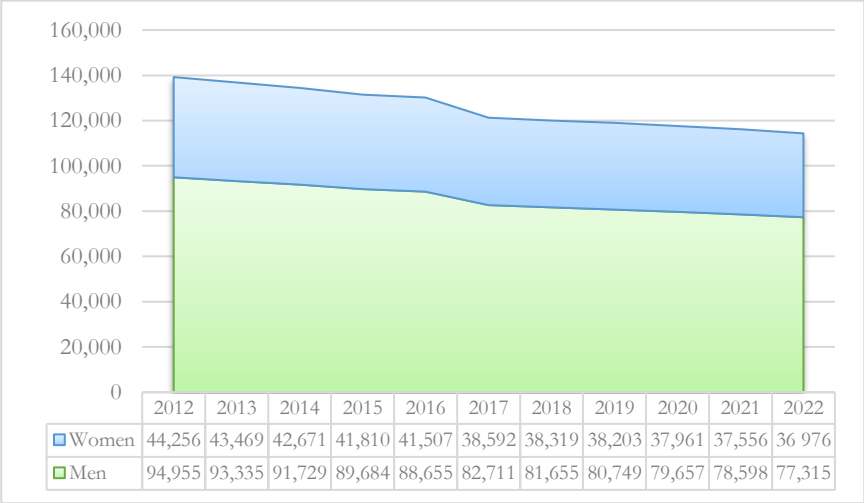
Figure 11. Identified reasons for the shortage of qualified staff

Results showed that one major contributing factor to the shortage of personnel is the discrepancy in qualifications, which also serves as a primary motivator for the implementation of DLS. This could be supported by the findings of Green and Pensiero, (2016), Smyth and Zimba (2019), who suggest that educational mismatch can drive businesses towards investing in apprenticeships for hiring professionals. This is mainly due to the low connection between educational institutions and business needs. This result consistent with earlier studies highlighting ineffective communication between establishments underscores the potential mismatch between educational requirements and labour market demands (Lalioti, 2019; Sauli, Wenger and Berger, 2021). The discrepancy between the skills acquired by students in higher education institutions and those required by employers contributes significantly to the challenge of successfully integrating graduates into the workforce (Graham, Shier and Eisenstat, 2014; Pholphirul, 2017). For example, in an Adult Skills Survey conducted by the Organisation for Economic Co-operation and Development (OECD) in Kazakhstan, approximately 41% of employees believe that their profession does not relate to their education field and almost 35% state that their tasks do not relate to their abilities (Chulanova, 2021).

Analysis of the primary motivation for investing in DLS reveals other underlying reasons beyond qualification mismatch, highlighting specific challenges within the agri-food sector. One of them is – the ageing of staff. This problem is also mentioned by Toleubayev, Jansen and van Huis (2010) underlining the diminished interest in agricultural work among rural youth, compounded by a shortage of specialists in the agri-food industry, which stands out as a significant concern. This is a reason for the depletion of new labour resources and an

increase in the number of pensioners representing agri-food labour resources (Nurzhanova *et al.*, 2020). These results can be confirmed by a decline in the proportion of young people between 14 and 28 years of age due to the outflow from rural areas to cities (*Figure 12*).

Low wages might have contributed to the lack of interest in pursuing careers in agriculture, leading to an ageing workforce (Alpysbaev, Mukhamadiyeva and Orazgalieva, 2023). These results are consistent with Sabirova *et al.* (2022), who studied the opinion of young people in Kazakhstan about their social well-being in terms of employment and revealed that low salaries are a significant factor contributing to youth unemployment. Zhankubayev, Molchanovskaya and Shumekov (2022) also emphasised that the massive outflow of workers in agriculture is mainly due to the flow of workers into the higher-paid service sector. According to the report on the labour market (Enbek, 2022), veterinary and agriculture workers receive the lowest wages – 161.9 – 167.3 thousand KZT per month (approximately 350 EUR per month), resulting in the flow of workers into the higher-paid service sector.



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Women	44,256	43,469	42,671	41,810	41,507	38,592	38,319	38,203	37,961	37,556	36 976
Men	94,955	93,335	91,729	89,684	88,655	82,711	81,655	80,749	79,657	78,598	77,315

Figure 12. The number of young people aged 14-28 in the rural areas of the Akmola region

Despite facing the challenges listed above in the agri-food sector, nearly all companies are confident that DLS is attracting young professionals. These results are consistent with Jansen *et al*. (2015), Lewis (2015) and Pogatsnik (2018) stating that apprenticeship programmes empower employers to tailor curriculum content to meet specific professional demands, thereby bridging the theory-practice gap and facilitating saving costs and smoother job transitions. Additionally, evidence indicates that graduates of such apprenticeship programs typically experience enhanced labour market prospects, including shortened job search

durations and increased employer retention rates post-graduation (Muehlemann and Wolter, 2020). Nevertheless, understanding the engagement of young individuals in farming requires consideration of factors such as individual motivation, aspirations, and perceptions (Consentino *et al.*, 2023). Lack of awareness about employment opportunities in agriculture and the need for a revised career advice curriculum might have affected the decisions of students to seek careers in the industry (Roy, 2023). Training satisfaction is found to be an important dimension influencing the intention to remain within the trained occupation (Liu, 2021). Moreover, perceived organisational support, encompassing factors like payment, recognition, and employer support, plays a significant role in retention within the trained industry (Forster-Heinzer *et al.*, 2016). To comprehensively understand and discern the hesitancy of young individuals to work in their specialised fields, identifying factors influencing their career intentions in the agri-food industry is essential.

4.3 Perception of employers of the businesses regarding costs associated with DLS compared to non-dual training

Results show that businesses perceive costs incurred in organising DLS to be relatively higher than ad-hoc/traditional training *(Table 7)*. Dual businesses mentioned wage payments to hired students for seasonal work in fields (F1D3), farms (F3D1), and veterinary clinics (F2D2, F2D3). They also referred to investing in equipment, learning materials, and infrastructure to organise the DLS and other costs that include organising exams, developing a curriculum, recruiting students, or processing contracts. All the above expenses are the responsibility of the dual businesses, except for mentoring costs, which are reimbursed for encouraging businesses to participate in the DLS.

Table 7. Identified cost categories for DLS and ad-hoc/traditional training

Dual	Non-dual
Wage payments of hired students (sometimes food, travel, and accommodation costs)	Training payment per calendar day for the employer
Training costs (costs for external and internal personnel): • Wages of mentors • Wages of tutors	Tuition payment (costs for training provider)
Infrastructure costs (providing workplaces, appliances)	Living expenses (if training is provided in another city or country)
Supplies costs (equipment, learning materials)	Travel costs to the place of study
Other costs (e.g., curriculum development, exams, recruitment)	

Non-dual businesses (F1N1, F1N2, F3N1) reported costs, including training, living, travel expenses and employee payments. They stated that approximate training costs range from 60-500 EUR per employee (F2N1-F2N4), and some of them do it for free. For example, F1N2 stated:

> Training is usually free (at the expense of the providers). However, we only need to pay for the trip, rarely for living as well.

Nevertheless, employers are responsible for covering the costs of training and retraining employees in non-dual businesses and determining the need for training and its scope. Results also show that costs of training could vary depending on the goals and capabilities of the company: small dual businesses (F2D1, F2D3, F2D4) usually train a few trainees (students), while large businesses (ex. F1D5) undertake joint training projects with several businesses for many students, subsequently bares much more costs:

> We invested 100,000 EUR in this project (F1D5). The cost for training is from 800,000 to 1,200,000 KZT (approximately 1600 – 2500 EUR) (F1D1).

Upon completion of the training (dual, non-dual (ad-hoc training only)), the trainee must work for the businesses they trained for a period agreed upon by both parties. However, this study encountered difficulties quantifying costs and benefits in monetary terms to determine the net cost of dual and ad-hoc/traditional training. None reported estimating the income generated from hiring students. Return on investment (ROI) is determined by working in the company for at least three to five years after graduation (F1D3, F1D1), but still, businesses do not apply ROI calculation:

> Our company's ROI is performed as the employment of graduates. They must work for three years after completing their studies (F1D1).
>
> Return on investment is the period of time spent working in the company—at least five years after graduation (F1D3).

Investing in DLS is motivated by the expectation of businesses that the knowledge and effort put into providing training will be recognised and rewarded (Vroom, Porter and Lawer, 2005). In the context of costs incurred, the 'Instrumentality' of Expectancy theory involves the expectations of managers about financial resources invested in the program, and this return is anticipated to come from hiring skilled professionals (Jansen *et al.*, 2015).

Dual businesses mentioned wage payments of hired students for seasonal work in fields (F1D3), farms (F3D1) and veterinary clinics (F2D2, F2D3), which increases costs for DLS training. Researchers (Asghar, Shah and Akhtar, 2016; Muehlemann and Wolter, 2020) also highlighted that businesses providing training invest in the general human capital of

apprentices in addition to paying them a wage, which increases the overall cost for the businesses. Identified cost categories for DLS match those observed in earlier studies. For example, providing or purchasing equipment, devices, and consumables for students at the workplace and allocating training places and facilities are cost elements incurred in DLS training (Asghar, Shah and Akhtar, 2016). Costs associated with developing methodological material, training software, and practice equipment fall under this category. Other costs include organising exams, developing a curriculum, recruiting students, or processing contracts (Mukhamadeyeva, Mukhamadeyev and Mukhamadeyeva, 2015). On top of that, dual businesses bear the costs for the training period during which they are unable to work productively due to their engagement in instructing students (Muehlemann and Wolter, 2014). Similarly to our findings, although the cost of training also varies depending on the size of the businesses, scope, and training frequency, training expenses for non-dual businesses are considered significantly lower than in DLS (Gambin and Hogarth, 2016).

DLS pay-offs are considered to be students who remain employed at the enterprise after completing their studies (Smyth and Zimba, 2019) and consideration of work for at least three to five years at the training company after graduation (F1D3, F1D1), but still, businesses do not apply cost-benefit calculations. This common belief is based on cost-benefit studies of the European Centre for the Development of Vocational Training (CEDEFOP, 2014), stating that almost all businesses have substantial net costs for apprenticeship training and reap benefits (including qualified staff) in the future. However, it is challenging for employers to provide data for cost-benefit analyses due to the lack of separate cost accounting for training (Gambin and Hogarth, 2016). For instance, businesses can purchase consumable materials for a laboratory for employees and students in one transaction. Furthermore, training does not necessarily lead to changes in sales volume, productivity, or other profit measures of businesses since many other factors can influence these parameters (Asghar, Shah and Akhtar, 2016). When businesses fail to effectively assess and communicate the tangible benefits derived from training programs, it creates uncertainty about the value of such investments and can serve as a deterrent for them contemplating investment in employee development (Muehlemann and Wolter, 2014). Clear cost assessment and communication of training program benefits are essential to instil confidence in decision-makers and encourage strategic investments in employee development (Das and Baruah, 2013).

4.4 Impact of the DLS on personnel turnover and attitude of employers on graduate recruitment

Table 8 summarises the responses of the businesses regarding employee turnover and the impact of learning (DLS/ad-hoc) on retention. As per *Table 8* and *Figure 9*, out of 11 dual businesses, 54% reported a high employee turnover, compared to 50% in non-dual businesses. All of them are mainly small businesses (45.5% dual and 50% non-dual):

> We are still experiencing staff turnover (F3N1), and it's still difficult to keep staff because wages are low (F2D1).

Large and medium-sized businesses (36.8% out of all businesses), however, reported turnover within normal limits:

> Our staff turnover is at most 8-9 %, which is considered normal for the company (F1D1). Staff turnover at our company is stable, between 3 and 5%. On average, our employees generally remain with the company for six years" (F1D2).

The positive impact of DLS on employee turnover was observed by only 27.7% dual and 25% non-dual, which are mainly large and medium businesses. Some respondents (27.7% dual and 50% non-dual), however, did not observe any changes or found it challenging to respond due to a lack of available data (for example, F2D3, F2D4, F2D5). A personnel reserve, typical in large businesses, mitigates staff turnover (F1N1). While small businesses only experience a decline in turnover during the student training period (F1D2, F1D4, F1D5, F2D1, F2D2). Most graduates do not remain at the small businesses for further employment after graduation:

> Some graduates want to remain after training. It is still a very small percentage (F1D4).

Nonetheless, dual businesses have a positive impact from DLS on employee retention compared to non-dual businesses:

> DLS participation has significantly reduced staff turnover; currently, the company employs three dual graduates (F1D2). Four specialists remained with the company as a result of the DLS project (F1D5).

Employers (F1D1, F1D4, F3N1, F3D1, F2N1, F2N2) also noted that turnover is mainly related to industry-specific factors. Employees hired for seasonal work, such as sowing and harvesting, usually leave at the end of the season. Since Kazakhstan is characterised by a harsh continental climate (especially in the Akmola region), fieldwork is not feasible during the winter, contributing to increased employee turnover.

Table 8. Employee turnover and impact of DLS/ad-hoc (traditional) training on retention

Business reference number	Dual		Business reference number	Non-dual	
	Employee turnover	Impact of DLS on retention		Employee turnover	Impact of ad-hoc/traditional training on retention
F1D1 (Large)			F3N1 (Small)		
F1D2 (Medium)			F1N1 (Large)		
F1D3 (Medium)			F1N2 (Medium)		
F1D4 (Small)			F2N1 (Small)		
F1D5 (Medium)			F2N2 (Small)		
F3D1 (Small)			F2N3 (Small)		
F2D1 (Small)			F2N4 (Medium)		
F2D2 (Small)			F2N5 (Medium)		
F2D3 (Small)					
F2D4 (Small)					
F2D5 (Small)					

- Businesses perceive that DLS/ad-hoc(traditional) training does not impact employee retention
- Businesses perceive that and DLS/ad-hoc(traditional) training positively impacts the organisation
- Due to a lack of data, no response was provided

Attitudes of employers toward graduate recruitment with DLS and traditional education were also described in the focus group discussions. The satisfaction of employers with the recruited professionals (or graduates) represents the degree to which they value the positive outcomes linked to willingness (or motivation) to invest in training and involvement in DLS. Some dual businesses (F1D1, F1D2) expressed satisfaction with the level of training of graduates. They recognised the advantages of this learning over a more traditional approach:

> The first thing I like about them is that they are easy to train. Also, because they are young, they can jump right into problems, react quickly to instructions, and develop creative solutions. Dual graduates are qualified enough for our needs (F1D1).

Other businesses (mainly small ones) have expressed dissatisfaction with the level of knowledge. They assert that graduates who have been exposed to DLS will not be considered more professional than those who have not:

> If I had one vacancy, there is no doubt that I would choose between the two dual and non-dual applicants (F3D1) …Sometimes, a non-dual graduate is more skilled than a dual one (F2D1).

In the context of employee turnover, instrumentality in Expectancy Theory refers to the perceived connection between participating in the DLS and the expected outcomes related to reducing employee turnover rates within the organisation (Gyepi-Garbrah *et al.*, 2023, p. 3). Specifically, it addresses the belief that the investment (or involvement) in DLS will lead to a positive impact on employee retention or recruitment of professionals (Das and Baruah, 2013).

Overall, the findings indicate a divergence of opinions among businesses regarding the dual approach in employee turnover, which poses a potential risk of reluctance to invest in

DLS (Howe *et al.*, 2023). Employee turnover is predominantly observed in small businesses, and DLS shows limited performance in altering this situation. Large (F1D1) and medium (F1D3) dual businesses mentioned having a personnel reserve, which mitigates staff turnover, while small businesses only experience a decline in turnover during the student training period (F1D2, F1D4, F1D5, F2D1, F2D2). These findings are consistent with the study of (Bishop, 2017), indicating that the retention rate varies according to the size of the company – large and medium businesses have more chances to hire graduates for extended periods. The study of Euwals and Winkelmann (2004) also found that retained graduated apprentices, especially those employed by larger firms, remained in their first job for significantly longer than apprentices hired by another company. As a result, larger firms are more likely to benefit from lower employee turnover rates.

The satisfaction of employers with the recruited professionals (or graduates) represents the degree to which they value the positive outcomes linked to willingness (or motivation) to invest in training and involvement in DLS (Vroom, Porter and Lawer, 2005). This study, however, showed that small businesses do not prioritise dual graduates over traditional graduates despite the benefits of reducing employee turnover from DLS, which is consistent with the study of Hogarth *et al.* (2012, p. 159), indicating that 'smaller, single-site workplaces tend to be more of an ad hoc approach sometimes in response to the offer of training from training providers'. The distinction in the quality of training for dual graduates, setting them apart, frequently relies on the resources and equipment available at the enterprises where they undergo their practice (Bishop, 2017). Small businesses reduce long-run unemployment exposure for apprentices, possibly due to differences in training quality (Horn, 2016). Also, the learning environments in small businesses tend to be less formal than those in large businesses, as large and medium-sized businesses are usually able to provide a more conducive learning environment (Kotey and Folker, 2007). It makes the transition to employment smoothest for those trained in large businesses (Winkelmann, 1996).

As a characteristic of the agri-food industry, seasonality might potentially impact staff turnover and ineffective training as well (Devereux and Longhurst, 2010). For instance, in winter[7], climatic conditions often lead to the suspension or reduced capacity of most production activities. Given that traditional education practice hours align with the general curriculum, a close collaboration with educational institutions in DLS would facilitate incorporating the seasonality aspect into the design of practical training hours (Jahan and

[7] Kazakhstan experiences a sharp continental climate, with limited agricultural activities during wintertime.

Shonchoy, 2018). This would enable the accommodation of additional labour needs during peak harvest periods or other fieldwork activities and contribute to a better student learning experience.

4.5 Summary

Results of this Chapter are drawn from the Expectancy Theory framework. Within the framework of Expectancy Theory, a distinction must be made between "expectation" and "instrumentality." In this study, expectations reflect the perceived direct outcomes of investing in the DLS, such as addressing the shortage of qualified specialists due to the mismatch between applicant qualifications and labour market requirements. This mismatch was the primary driver of employer engagement with DLS. Moreover, the study revealed deeper structural challenges in the agri-food sector, such as the unwillingness of young people to remain in the industry post-graduation, often due to low wages, further reinforcing employers' motivation to invest in more targeted, work-based training.

On the other hand, instrumentality refers to the extent to which those expected outcomes lead to valued organisational benefits, such as cost savings and improved staff retention. The findings showed that while some employers perceived short-term improvements in employee turnover through DLS, particularly in small businesses, others struggled to realise long-term benefits. Cost-related concerns also emerged, with several businesses reporting that DLS incurs higher upfront costs than ad-hoc training, especially when ROI is uncertain. Larger businesses, however, were more likely to treat DLS as a strategic component of human capital development. Additionally, challenges like seasonal employment patterns in the agri-food sector further influenced the perceived instrumentality of DLS participation.

Employers consider qualified specialists a reward ('Valence') for their involvement in the DLS. However, small businesses remain dissatisfied with the quality of graduates' training. Large and medium businesses, however, prefer capable dual candidates. Company size influences these dynamics.

Overall, the effectiveness of the DLS as an approach for attracting professionals is contingent on industry-specific characteristics and company sizes. Articulating the long-term benefits of engagement in DLS poses a significant challenge for many employers. The presence of elevated costs associated with DLS implementation, along with uncertainties regarding RIO, might further complicate the decision-making process for organisations

considering DLS involvement. Notably, the DLS implementation falls short of effectively addressing specific challenges within the agri-food sector, such as issues related to employment seasonality and the reluctance of young individuals to pursue careers in the industry. This contributes to the broader concern of an ageing workforce in the agri-food sector, emphasising the need for targeted strategies to address these industry-specific challenges comprehensively.

Chapter 5. Dual learning dynamics: training satisfaction and career intentions of Kazakhstani agri-food students and graduates

5.1 Introduction

This Chapter explores the satisfaction level with the practice experience from the perspectives of students and graduates of dual and non-dual forms of education and answers the fourth research question of this study:

RQ4. Do DLS learners have a better practice experience than students and graduates of traditional training?

Since we have students and graduates of two different education approaches (dual and non-dual), the satisfaction level with the practice experience will be tested between students (SDLS—STF), between graduates (GDLS—GTF), and between dual (SDLS, GDLS) and non-dual (STF, GTF) learners overall.

Considering the potential impact of the DLS on the seamless transition of graduates from academia to their prospective specialised fields, this Chapter also explores the post-graduate intentions of students and graduates who have undergone DLS programs compared to those who have not. Therefore, it aims to answer the last research question of this study:

RQ5. What factors impact the intention of dual and non-dual learners to remain in the training company (industry) to:

- remain within their current industry or training company, or
- switch employers within the same industry, or
- transit to entirely different industries unrelated to their trained specialisation.

5.2 Conceptual framework and hypothesis development

Below, a conceptual framework illustrates factors that will be tested to examine students' and graduates' intentions to remain or leave the industry (*Figure 13*).

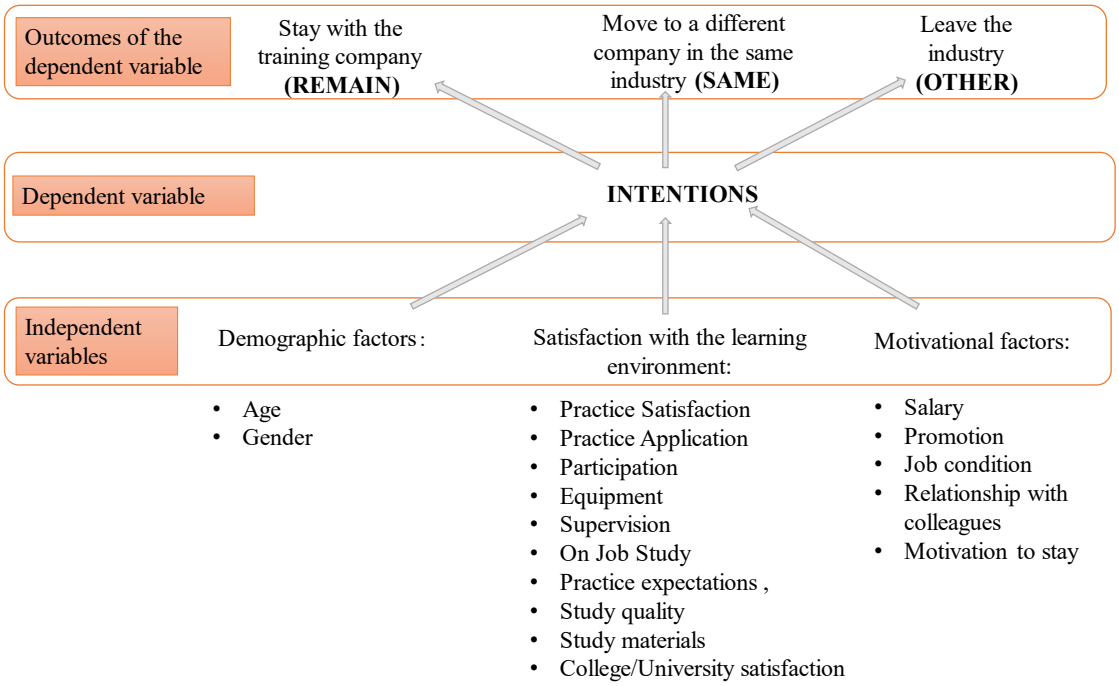


Figure 13. Conceptual framework

Demographic factors

Graduating mature students have greater difficulties obtaining a suitable job than their younger counterparts since their age impacts the completion of apprenticeship (Laporte and Mueller, 2013) programmes and employment outcomes (Dummert, 2021). Additionally, Xu (2013) considered age as a factor that influences career choices for college graduates. Gender, along with age factors, contributes to shaping the perspectives and decisions of students when considering their future careers and education (Billett, Choy and Hodge, 2020). A study by Holtmann and Solga (2023) showed findings suggesting differences in dropout rates from VET between males and females. It may be because male apprentices tend to quit more often if they need a secondary job to cover living costs, while family plans may have more influence on female apprentices (Seidel, 2019).

Satisfaction factors

The training satisfaction measure describes how satisfied students are with the training and internship experiences they receive during their educational program (Liu, 2021). Satisfaction with the training is an important factor in predicting job satisfaction and confidence about future careers (Lee and Chao, 2013). Generally, higher satisfaction levels lead to fewer quits,

suggesting that improving satisfaction could reduce apprenticeship dropout rates (Forster-Heinzer *et al.*, 2016; Seidel, 2019). Holtmann and Solga (2023) also stated that if someone is not satisfied with their vocational education and training, they might change jobs or training programs.

Motivational factors

Practice in a workplace and being hired during practice allows learners to assess the corporate environment and prospects of future positions. This includes observing real working conditions, interacting with colleagues, and forming an impression of whether they would want to continue working in that setting after graduation. For this reason, this study grouped factors such as salary, job conditions, team relationships, and career prospects under motivational factors, as they go beyond general practice satisfaction and relate directly to learners' experiences in real work environments.

Training programs that offer payment are highly valued by apprentices as they facilitate their ability to remain enrolled without financial strain (Smith *et al.*, 2021; Holtmann and Solga, 2023) and increase job satisfaction (Gow *et al.*, 2008; Xu, 2013). According to Beckmann (2023) and Donkor, (2012), apprentices are more likely to quit if they are dissatisfied with their payment structure and future earnings.

The quality of interpersonal relationships within the training environment is another crucial factor. Masdonati, Lamamra, and Jordan (2010) state that apprentices may abandon training prematurely because of poor relationships with trainers or a negative atmosphere. Furthermore, positive relationships with colleagues foster a sense of belonging at work and improve job satisfaction and retention (Lee and Chao, 2013; Holtmann and Solga, 2023).

Career progression and better employment prospects also strongly influence decisions to remain or depart post-completion (Smyth and Zimba, 2019; Smith *et al.*, 2021). As noted by Lee and Chao (2013), promotion opportunities are crucial to employee retention, emphasising the importance of clear pathways for career advancement as well as opportunities for personal and professional growth. A conducive work environment and motivation among apprentices in a training program cannot be overstated (Lee and Chao, 2013). The perceptions of working conditions (Wydra-Somaggio, 2021) and motivational initiatives (Gow *et al.*, 2008) play an important role in determining the willingness of apprentices to remain in their programs. Assigning students tasks unrelated to their trade during training may significantly diminish their motivation, resulting in a lack of interest in the profession (Donkor, 2012).

Based on the literature above, the following hypotheses are proposed to study satisfaction and post-graduate intentions:

(H1) Dual students and graduates have a better practice experience than non-dual students and graduates.

(H2) Demographic conditions (age, gender) are factors affecting the choice of respondents for remaining with the company/industry.

(H3) Practice experience factors (practice satisfaction, practice application, participation, equipment, supervision, on-the-job study, practice expectations, including satisfaction with the study in college/university, its material and quality) are affecting the choice of respondents for remaining with the company/industry.

(H4) Motivational factors (job condition, relationship with colleagues and motivation, salary and promotion) are the key factors affecting the choice of respondents to remain with the company/industry.

5.3 Descriptive statistics

Table 9 presents the summary of the intentions of learners after graduation. Intention of dual learners to remain with the training provider is higher than non-dual (42.4% versus 28.8%) whereas intention of moving to other industries is higher for non-dual (21/7% versus 17.5%). There is no difference in the percentages of intentions between dual and non-dual learners to remain within the industry (40% versus 40.9%).

Table 9. Intentions outcomes

Intentions	Non-dual		Total, n (%)	Dual		Total, n (%)
	STF, n (%)	GTF, n (%)		SDLS, n (%)	GDLS, n (%)	
Remain	129 (68.6)	59 (31.4)	188 (28.8)	64 (69.6)	28 (30.4)	92 (42.5)
Same	259 (80.4)	63 (19.6)	322 (49.5)	70 (80.5)	17 (19.5)	87 (40)
Other	109 (77.3)	32 (22.7)	141 (21.7)	30 (79)	8 (21)	38 (17.5)
Total	497 (76.3)	154 (23.7)	651 (100)	164 (75.6)	53 (24.4)	217 (100)

Table 10 presents basic summary statistics of socio-economic characteristics of learners. Non-dual respondents constitute 75% (651), whereas dual participants represent 25% (127). Both groups do not share a similar age distribution, with 71.8% of non-dual respondents falling within the 20-25 age group, while 49.7% of dual respondents are 16-19 years old. Women and men are represented nearly equally in the non-dual (48.2% and 51.8%, respectively), whereas men account for the majority in the dual (66.4%) group. Less than half of the traditional respondents (44.7%) indicated they had been paid during their practice. 44.7% of non-dual

learners received payment during their practice, while around 61% of dual respondents reported earning wages, primarily within the average salary range of 51,000 KZT to 150,000 KZT. Those who have promotion opportunities were noted to be nearly similar in both groups (non-dual 64.4%, dual 67.7%) (*Table 10*).

Table 10. Summary statistics of socio-economic characteristics

Variables	Non-dual respondents (N=651)				Dual respondents (N=217)			
	Outcome dependent variables			Total Non-dual (% in group)	Outcome dependent variables			Total Dual (% in group)
	Remain y=1	Same y=2	Other y=3		Remain y=1	Same y=2	Other y=3	
Demographic variables:								
Age								
<16-19	43(35.3)	56(45.9)	23(18.8)	122(18.7)	42(38.9)	48(44.4)	18(16.7)	108(49.7)
20-25	110(23.5)	245(52.4)	113(24.1)	468(71.8)	24(32)	35(46.7)	16(21.3)	75(34.6)
>26	35(57.4)	21(34.4)	5(8.2)	61(9.3)	26(76.5)	4(11.8)	4(11.7)	34(15.7)
Gender								
Male	95(30.3)	149(47.5)	70(22.2)	314(48.2)	65(45.1)	52(36.1)	27(18.8)	144(66.4)
Female	93(27.6)	173(51.3)	71(21.1)	337(51.8)	27(37)	35(48)	11(15)	73(33.6)
Motivational variables:								
Salary								
Not Paid	77(21.4)	201(55.8)	82(22.8)	360(55.3)	31(36.5)	40(47.1)	14(16.4)	85(39.2)
<50000 KZT	15(26.8)	28(50)	13(23.2)	56(8.6)	6(23.1)	12(46.2)	8(30.7)	26(12)
51000-150000 KZT	42(32.6)	55(42.6)	32(24.8)	129(19.8)	37(52.1)	25(35.2)	9(12.7)	71(32.7)
>151000 KZT	54(50.9)	38(35.9)	14(13.2)	106(16.3)	18(51.4)	10(28.6)	7(20)	35(16.1)
Promotion								
Yes	156(37.2)	195(46.6)	68(16.2)	419(64.4)	78(53.1)	53(36.1)	16(10.8)	147(67.7)
No	32(13.8)	127(54.7)	73(31.5)	232(35.6)	14(20)	34(48.6)	22(31.4)	70(32.3)

1. n (%)
2. KZT – Kazakhstani tenge (1 KZT = 0.0017 GBR)

Table 11. Summary statistics of the satisfaction and motivational variables

Practice experience variables	DLS		TF		Chi-square
	mean	SD	mean	SD	
Satisfaction variables					
Practice satisfaction	5.6	1.5	4.9	1.6	29.2***
Practice application	5.4	1.5	4.9	1.6	19.5***
Participation	5.7	1.4	5.3	1.5	12.5***
Usage of equipment	5.6	1.4	5.2	1.6	9.9***
Supervision	5.9	1.3	5.5	1.5	11.3***
On job study	5.8	1.3	5.4	1.6	13.5***
Study quality in the College/University	5.8	1.4	5.4	1.4	11.2***
Study materials in the College/University	5.6	1.5	5.4	1.4	6.0***
College/University satisfaction	5.8	1.3	5.5	1.4	9.9***
Practice expectations	5.4	1.5	4.9	1.6	13.3***
Motivation variables					
Job Condition	5.6	1.3	5.2	1.5	10.9***
Colleagues	5.9	1.3	5.7	1.4	5.1**
Motivation	5.7	1.4	5.3	1.4	15.0***

Note: *** = significant at 1% level ($p < 0.01$): **= significant at 2% level ($p < 0.02$):

The mean scores of dual group respondents were generally higher, ranging from 5.4 to 5.9, suggesting generally higher satisfaction levels compared to the non-dual group. This trend was consistent across motivational variables (*Table 11*).

5.4 Difference in satisfaction with the practice experience between the dual and non-dual groups

Results of the Kruskal-Wallis Test showed significant differences in satisfaction with the practice experience variables between all groups (*Table 12*). The mean rank of students and graduates under the DLS was higher than that of TF students and graduates for all variables except "study materials." Graduates of the traditional form (GTF) (mean rank = 452.81) were more satisfied with study materials provided by educational institutions than DLS graduates (GDLS) (mean rank = 443.59). However, the difference between the groups was significant ($p = .012$).

Table 12. Kruskal-Wallis Test

Variables	Respondents (N)	Mean Rank	Kruskal-Wallis H (chi2)	Asymp. Sig.	Effect size (Chi2/N-1)
Practice Satisfaction	1-STF (497) 2-GTF (154) 3- SDLS (164) 4-GDLS (53)	442.10 399.78 559.07 505.63	38.035	.000	.004
Practice Application	1-STF (497) 2-GTF (154) 3- SDLS (164) 4-GDLS (53)	443.48 417.24 541.11 492.12	23.636	.000	.026
Participation	1-STF (497) 2-GTF (154) 3- SDLS (164) 4-GDLS (53)	448.16 420.82 542.03 446.51	21.678	.000	.023
Equipment	1-STF (497) 2-GTF (154) 3- SDLS (164) 4-GDLS (53)	458.03 406.09 537.06 426.76	23.264	.000	.025
Supervision	1-STF (497) 2-GTF (154) 3- SDLS (164) 4-GDLS (53)	446.02 434.17 529.89 455.40	15.691	.001	.017
On-the-Job Study	1-STF (497) 2-GTF (154) 3- SDLS (164) 4-GDLS (53)	450.88 408.98 542.74 456.90	24.641	.000	.026
Study quality in the College/University	1-STF (497) 2-GTF (154) 3- SDLS (164) 4-GDLS (53)	447.74 434.02 532.22 437.72	16.346	.001	.017
Study materials	1-STF (497) 2-GTF (154) 3- SDLS (164) 4-GDLS (53)	446.71 452.81 511.95 443.59	8.321	.040	.009
College/University satisfaction	1-STF (497) 2-GTF (154) 3- SDLS (164) 4-GDLS (53)	447.27 440.37 519.05 455.78	10.899	.012	.011
Practice expectations	1-STF (497) 2-GTF (154) 3- SDLS (164) 4-GDLS (53)	449.20 417.81 542.46 446.04	22.087	.000	.024

Table 13. Mann-Whitney test results on practice experience between groups

Practice experience variables	Mann-Whitney U		DLS		TF		Chi-square (x^2)
	U	Sig.	mean	sd	mean	sd	
Comparison of the DLS and TF students							
Practice satisfaction	51420.5	.000	5.7	1.5	5	1.6	25.3***
Practice application	49883.5	.000	5.5	1.5	4.9	1.5	18.5***
Participation	49347.5	.000	5.8	1.4	5.3	1.5	16.4***
Usage of equipment	48048.0	.000	5.7	1.3	5.3	1.5	11.8***
Supervision	48424.0	.000	6	1.3	5.6	1.5	13.0***
On job study	49074.0	.000	6	1.2	5.5	1.4	15.3***
Study quality in the College/University	48656.5	.000	5.9	1.4	5.4	1.4	13.8***
Study materials in the College/University	46780.5	.004	5.7	1.6	5.5	1.4	8.0***
College/University satisfaction	47544.5	.001	5.9	1.4	5	1.4	10.2***
Practice expectations	49234.5	.000	5.5	1.4	5	1.5	15.9***
Comparison of the DLS and TF graduates							
Practice satisfaction	4935.0	.022	5.3	1.6	4.7	1.6	5.1**
Practice application	4643.5	.133	5.1	1.4	4.7	1.7	2.2
Participation	4163.0	.826	5.2	1.4	5.1	1.6	0.1
Usage of equipment	4249.5	.652	5.1	1.6	4.9	1.7	0.2
Supervision	5725.0	.562	5.6	1.4	5.4	1.6	0.3
On job study	5852.5	.359	5.4	1.5	5.2	1.7	0.8
Study quality in the College/University	5628.5	.753	5.5	1.3	5.4	1.4	0.1
Study materials in the College/University	5509.0	.994	5.4	1.4	5.4	1.5	0
College/University satisfaction	5843.0	.372	5.7	1.3	5.5	1.4	0.7
Practice expectations	5729.0	.562	5.0	1.5	4.8	1.5	0.3
Comparison of the DLS students and graduates and TF students and graduates							
Practice satisfaction	53349.5	.000	5.6	1.5	4.9	1.6	29.2***
Practice application	56502.0	.000	5.4	1.5	4.9	1.6	19.5***
Participation	59304.0	.000	5.7	1.4	5.3	1.5	12.5***
Usage of equipment	60552.0	.001	5.6	1.4	5.2	1.6	9.9***
Supervision	59881.0	.000	5.9	1.3	5.5	1.5	11.3***
On job study	58844.0	.000	5.8	1.3	5.4	1.6	13.5***
Study quality in the College/University	59883.5	.000	5.8	1.4	5.4	1.4	11.2***
Study materials in the College/University	62765.5	.012	5.6	1.5	5.4	1.4	6.0***
College/University satisfaction	60560.0	.001	5.8	1.3	5.5	1.4	9.9***
Practice expectations	58939.5	.000	5.4	1.5	4.9	1.6	13.3***

Note: Likert scale from min 1to max 7
*** = significant at 1% level ($p < 0.01$)
**= significant at 2% level ($p < 0.02$)

Comparison of the DLS and TF students

A Mann-Whitney U test showed that DLS students reported significantly higher scores across various measures compared to TF students. These include practice satisfaction, practice application, participation, usage of equipment, supervision, on-the-job study, study quality and materials in college/university, overall college/university satisfaction, and practice expectations. All differences were statistically significant with p-values < 0.001 for most comparisons, indicating robust evidence that DLS students have more positive experiences and perceptions in these areas compared to TF students (

Table 13).

Comparison of the DLS and TF graduates

DLS graduates reported significantly higher practice satisfaction compared to TF graduates, with a mean of 5.3 (sd = 1.6) versus 4.7 (sd = 1.6), respectively (Mann-Whitney U = 4935.0, p = 0.022, Chi-square = 5.1). However, for other variables such as practice application, participation, usage of equipment, supervision, on-job study, study quality, study materials, college/university satisfaction, and practice expectations, there were no significant differences between DLS and TF graduates. This suggests that while DLS graduates are more satisfied with their practice experiences, both groups have similar perceptions and experiences in other aspects of their practical training (

Table 13).

Comparison of the DLS and TF students and graduates

The combined analysis of students and graduates shows that the DLS group consistently reported higher scores across multiple variables compared to the TF group. DLS participants had significantly higher practice satisfaction (mean = 5.6 vs. 4.9), practice application (mean = 5.4 vs. 4.9), participation (mean = 5.7 vs. 5.3), usage of equipment (mean = 5.6 vs. 5.2), supervision (mean = 5.9 vs. 5.5), on-job study (mean = 5.8 vs. 5.4), study quality (mean = 5.8 vs. 5.4), study materials (mean = 5.6 vs. 5.4), college/university satisfaction (mean = 5.8 vs. 5.5), and practice expectations (mean = 5.4 vs. 4.9). These differences were all statistically significant, indicating a generally more positive experience for the DLS group across these dimensions (

Table 13).

Along with the Mann-Witney U test, a pairwise comparison (Independent-Samples Kruskal-Wallis test) was conducted to compare whether there is a difference in the practice experience dimensions (satisfaction variables) for DLS - TF students, DLS - TF graduates and overall learners under the DLS and TF. Normally, the number of comparisons depends on the number of groups analysed. As this study has four groups, six pairwise comparisons were retrieved from the test. However, based on the research questions, this study focuses only on two of them: DLS students - TF students and DLS graduates – TF graduates. This test also revealed that there is a significant difference in practice experience between DLS

and TF students and no significant differences between graduates of the DLS and TF groups, except for 'practice satisfaction' and 'practice application' variables (*Table 14*). However, a comparison of the DLS and TF learners overall (DLS students and graduates, TF students and graduates) shows greater satisfaction with the practice experience in the DLS group rather than the TF group.

Overall, the first hypothesis (H1) can be supported since the comparison of DLS and TF groups, including students and graduates, revealed a significant difference in satisfaction experience. Thus, DLS respondents are more satisfied with practice experience than TF respondents.

Table 14. Independent-Samples Kruskal-Wallis Test

	DLS-TF	Test Statistic	SE	Std. Test Statistic	Sig.	Adj. Sig.
Practice Satisfaction	Graduates of DLS-TF	89.9	39.4	2.28	.022	.134
	Students of DLS-TF	111.9	39.1	5.02	.000	.000
Practice Application	Graduates of DLS-TF	-74.878	37.125	-2.017	.044	.262
	Students of DLS-TF	-97.631	23.587	-4.139	.000	.000
Participation	Graduates of DLS-TF	-25.693	36.896	-.696	.486	1.000
	Students of DLS-TF	-93.868	23.441	-4.004	.000	.000
Equipment	Graduates of DLS-TF	-20.672	37.008	-.559	.576	1.000
	Students of DLS-TF	-79.032	23.513	-3.361	.001	.005
Supervision	Graduates of DLS-TF	-21.231	36.192	-.587	.557	1.000
	Students of DLS-TF	-83.872	22.994	-3.648	.000	.002
On the Job Study	Graduates of DLS-TF	-47.915	36.610	-1.309	.191	1.000
	Students of DLS-TF	-91.861	23.260	-3.949	.000	.000
Study quality in the College/University	Graduates of DLS-TF	-3.703	36.585	-.101	.919	1.000
	Students of DLS-TF	-84.478	23.244	-3.634	.000	.002
Study materials	Graduates of DLS-TF	9.224	36.723	.251	.802	1.000
	Students of DLS-TF	-65.246	23.331	-2.796	.005	.031
College/University satisfaction	Graduates of DLS-TF	-15.410	36.548	-.422	.673	1.000
	Students of DLS-TF	-71.773	23.221	-3.091	.002	.012
Practice expectations	Graduates of DLS-TF	-28.231	37.118	-.761	.447	1.000
	Students of DLS-TF	-93.256	23.583	-3.954	.000	.000

5.5 Outcomes on the post-graduate intentions of dual and non-dual learners

A principal component extraction method with VARIMAX rotation was used to extract the dimensions of 13 satisfaction and motivational variables. Variables with factor loadings greater than 0.3 were selected for analysis (*Table 15*).

Table 15. PCA result

Variable	Components for TF			Components for DLS		
	(1)	(2)	(3)	(1)	(2)	(3)
Practice satisfaction	0.310	0.032	0.085	0.368	0.009	0.018
Practice application	0.345	0.178	-0.122	0.388	-0.130	0.147
Participation	0.532	-0.099	-0.119	0.409	0.033	-0.103
Equipment	0.456	-0.033	-0.007	0.441	-0.030	-0.043
Supervision	0.365	0.004	0.107	0.413	0.029	-0.021
On job study	0.331	-0.004	0.137	0.388	0.013	0.014
Practice expectations	0.214	0.134	0.155	0.165	0.280	0.021
Study quality in the College/University	0.017	0.552	-0.029	0.024	0.040	0.524
Study materials	-0.040	0.568	-0.005	-0.039	-0.021	0.612
College/University satisfaction	-0.035	0.557	0.023	0.016	0.005	0.561
Job Condition	-0.014	0.010	0.533	-0.003	0.566	-0.016
Colleagues	-0.018	-0.027	0.561	0.010	0.510	0.011
Motivation	-0.030	0.005	0.556	-0.039	0.565	0.015
Variance	3.91	2.95	2.77	4.58	2.80	2.69
Cumulative variance (%)	30.1	52.8	74.2	35.3	56.8	77.6
Cronbach's alpha	0.91	0.92	0.87	0.90	0.89	0.92

Principal component analysis (PCA) (Beattie and Esmonde-White, 2021) extracted three components: (1) Practice satisfaction, (2) Study satisfaction, and (3) Employee-retention initiatives for both groups (*Table 15*). All three components explain 74.2% (non-dual) and 77.6% (dual) of the total variance. The overall Cronbach's alpha for the scale is high at 0.94 for both groups. Values for each component exceed its reliable value (0.7), which is considered adequate for a satisfactory level of reliability in basic research (Tavakol and Dennick, 2011). Extracted components along with demographic (age, gender) and motivational variables (salary, promotion) are used in MNL regression presented in the *Table 16.*

Positive (*b*) coefficients indicate a higher probability of pursuing the same industry or leaving the industry than remaining with the practice company, while negative (*b*) coefficients indicate a decreased probability of pursuing the same industry or leaving the industry as compared to intentions to remain (*Appendix D*).

Older dual learners (>26) are significantly less likely to apply to the same industry (compared to their younger counterparts) rather than remain with their practice company (b = -2.034, p = 0.001). Similarly, older non-dual learners are less likely to leave the industry (b =

-1.151, p = 0.049), indicating higher intention among older respondents only. The predicted probabilities of young age (<16-19) for both groups showed relatively similar results (*Appendix E*). Nevertheless, the percentage of DLS respondents aged 20-25 and older (>26) willing to remain in the training company (industry) exceeds TF respondents by 14.1% and 20.9% respectivelly. Gender variable, however, does not affect intentions for both groups. Additionally, we have specified a set of interaction terms between each age group and gender characteristics to test whether the effect of age variable changes in terms of gender. The test showed similar insignificant results for the gender variable. Thus, we can conclude that the second hypothesis (H2) is not rejected in terms of age variable only since there was a significant difference in getting older and intentions to remain in the company (industry).

Table 16. Determinants of the intentions of dual and non-dual learners after graduation

Base: REMAIN, y=1 / Variables	SAME, y=2			OTHER, y=3			LR, P>chi^2
	b	P>z	RRR	*b*	P>z	RRR	
Dual learners							
Age (<16-19):							
20-25	-0.228	0.598	0.795	0.544	0.924	1.056	0.809
>26	**-2.034**	**0.001**	**0.130**	-0.855	0.235	0.425	0.001
Gender (Female)	0.159	0.686	1.172	-0.484	0.371	0.616	0.431
Salary (not paid)							
-less than 50K- 51K	0.094	0.876	1.098	1.178	0.100	3.250	0.159
-51K-150K	-0.665	0.102	0.513	-0.575	0.313	0.562	0.244
-151K and more	-0.599	0.273	0.548	-0.100	0.882	0.904	0.511
Promotion (no)	0.535	0.208	1.948	**1.299**	**0.009**	**3.667**	0.031
Practice satisfaction	**-0.181**	**0.018**	**1.708**	**-0.337**	**0.000**	**0.713**	0.001
Employee-retention initiatives	**0.353**	**0.035**	**1.424**	0.080	0.665	1.083	0.056
Study satisfaction	**0.382**	**0.043**	**1.466**	0.265	0.230	1.304	0.113
_cons	-0.186	0.827	0.830	-1.879	0.078	0.152	
Non-dual learners							
Age: (<16-19)							
20-25	0.419	0.086	1.521	0.490	0.113	1.633	0.170
>26	-0.490	0.186	0.612	**-1.151**	**0.049**	**0.316**	0.097
Gender (Female)	0.067	0.739	1.069	0.021	0.932	1.021	0.938
Salary: (not paid)							
-less than 50K- 51K	-0.29	0.937	0.971	0.234	0.601	1.263	0.781
-51K-150K	-0.338	0.192	0.713	0.249	0.423	1.283	0.080
-151K and more	**-0.849**	**0.002**	**0.427**	**-0.725**	**0.054**	**0.484**	0.008
Promotion (no)	**0.769**	**0.001**	**2.158**	**1.216**	**0.000**	**3.375**	0.000
Practice satisfaction	**-0.099**	**0.010**	**0.905**	**-0.205**	**0.000**	**0.813**	0.000
Study satisfaction	0.022	0.820	1.023	-0.029	0.802	0.970	0.859
Employee-retention initiatives	**0.286**	**0.018**	**1.332**	**0.353**	**0.013**	**1.423**	0.025
_cons	-0.473	0.340	0.309	-2.115	0.001	0.120	

Note: Bold figures represent significance at 5 percent level (p<0.05).

Number of obs. dual learners = 217; Number of obs. non-dual learners = 651.

Practice satisfaction is a strong predictor for both groups and higher satisfaction levels significantly reduce the likelihood of changing employers or leaving the industry. However, this effect is more pronounced for dual learners ('remain' category b = -0.181, p = 0.018, 'other' category b = -0.337, p < 0.001) than for non-dual learners (b = -0.099, p = 0.010, 'other' category b = -0.205, p = 0.000). Additionally, dual learners showed higher satisfaction with their studies at the educational institution (b = 0.382, p = 0.043) and are more inclined to pursue careers in the same industry. These significant differences among groups lead us to accept the third hypothesis (H3).

For non-dual respondents, a higher salary of >151000 KZT during practice decreases the probability of changing employer in the same industry (b = -0.849, p = 0.002) or leaving the industry (b = -0.725, p = 0.054) compared to those who are not paid. However, this dimension is not significant for dual respondents. Predicted probability results showed that 28.4% of TF respondents and 50% of DLS respondents are willing to remain with the company (industry) if they have an average payment of 51K-150K KZT (*Appendix F*). Overall, the probability of remaining because of being paid during practice for the DLS group is higher than for the TF group.

Lack of promotion increases the likelihood for non-dual learners to switch employers (b = 0.769, p = 0.001) or leave the industry (b = 1.216, p = 0.000), indicating a broad impact on employment stability due to the lack of career advancement opportunities. Dual learners have a stronger effect than non-dual learners (RRR= 3.667) to leave the industry due to the lack of promotion. Both dual and non-dual learners showed a significant positive relationship between employee retention initiatives and intention to remain. Dual learners have greater chances to remain in the same industry (b = 0.353, p = 0.035), whereas non-dual learners may also consider leaving the industry despite opportunities facilitated by such initiatives (b = 0.353, p = 0.013). Predicted probabilities indicate that 34% and 48.5% of TF respondents have promotion prospects and willing to remain with the practice company and stay in the same industry, respectively. However, DLS respondents have higher probability to remain with the practice company than TF respondents. (*Appendix G*). Since salary, employee-retention initiatives and promotion are the key factors affecting the intentions of respondents to remain with the company/industry at a significant level, we accept the H4 hypothesis.

5.5.1 Post-estimations of the MNL model

Wald and Likelihood-ratio tests were used to test the effects of the independent variables (*Table 16*). The effect of age (>26), motivation, satisfaction with the practice at the workplace, salary (non-dual), Promotion (non-dual) and satisfaction with the study in an educational institution (dual) have a significant effect at the 0.01 level on the intentions of respondents.

Table 17 presents model-fitting information obtained from the MNL regression application. It indicates a robust model fit (x2=76.2 (dual), x2=115.9 (non-dual), p=0.000) for both models, indicating that they fit significantly better than a null model.

Table 17. Model fitting information

Model	Model fitting criteria Log-likelihood value	Likelihood ratio test statistics		
		x^2	*df*	*p*
Dual	-186.56	76.2	20	0.000
Non-dual	-617.92	115.9	20	0.000

Tests for combining dependent categories were used to examine if none of the independent variables (choice outcomes) significantly affects the odds of outcomes. Results indicate that all the categories are distinguishable for both groups (*Table 18*).

Table 18.Test for combining dependent categories

	Dual (n=217)			Non-dual (n=651)		
	x^2	*df*	*p*	x^2	*df*	*p*
Other & Same	18.063	10	0.054	21.107	10	0.020
Other & Remain	47.089	10	0.000	94.935	10	0.000
Same & Remain	47.769	10	0.000	68.775	10	0.000

In multinomial logit models, a stringent assumption is that outcomes have the property of independence from irrelevant alternatives (IIA) (Long and Freese, 2014). This assumption assumes that the inclusion or exclusion of categories does not alter the relative risks associated with the remaining regressors. The results of the IIA test are presented in *Table 19.*

Table 19. Independence of Irrelevant Alternatives (IIA) tests

Omitted	Dual			Non-dual		
	x^2	*df*	*p*	x^2	*df*	*p*
Hausman tests						
Other	-1.735	11	-	-1.045	11	-
Same	-2.248	11	-	-8.957	11	-
Remain	-0.179	11	-	0.363	11	1.000
Small-Hsiao tests						
Other	16.940	11	0.110	1.425	11	1.000
Same	26.336	11	0.006	10.519	11	0.484
Remain	18.637	11	0.068	11.447	11	0.407

Although almost all negative results of our test are evidence that IIA has not been violated (Hausman and McFadden, 1984), some researchers do not believe that IIA results are useful since, using the same model, they can obtain different results (Long and Freese, 2014). Based on the estimation of a restricted choice set, Cheng and Long (2007) conclude that tests of the IIA assumption are inadequate for applied purposes.

5.6 Discussion

5.6.1 Difference in satisfaction with the practice experience between the dual and non-dual groups

A comparison of satisfaction experiences between students and graduates of DLS and TF showed that DLS respondents are more satisfied with their practice than traditional ones. This finding is consistent with the previous studies examining practice satisfaction with apprenticeship programs (Smith and Wilson, 2003; Gow *et al.*, 2008; Law, 2010; Sadler *et al.*, 2010; Forster-Heinzer *et al.*, 2016; Liu, 2021; Rubain and Nouatin, 2021). Specifically, Sadler *et al.* (2010) reviewed 53 studies examining learning outcomes associated with apprenticeships, including the experiences and learning outcomes related to participation in apprenticeships. Many studies have shown that participants in apprenticeships often report positive experiences, highlighting numerous benefits such as improved skills in research processes, communication, and technical abilities.

A comparison of DLS and TF graduates, however, showed contradicting results indicating non-significant differences between the groups in many dimensions. These results are in line with the findings of Umeokafor *et al.* (2021), stating that there were no strong correlations between the characteristics of the apprenticeship programs and the engagement or satisfaction of apprentices. The explanation for these findings could be in the relatively recent introduction of the DLS to the business communities that are still developing in terms of organisational processes at the workplace (NCE, n.d.). There are a number of companies enrolling in DLS yearly (*Figure 3, section 2.4, Chapter 2*) which could make it difficult to control if companies meet the requirements for conducting training based on rules for DLS (Talap, 2020). Failure of DLS companies to meet the organisational needs may negatively impact the satisfaction of previous students (graduates) (Umeokafor *et al.*, 2021).

5.6.2 Influence of demographic factors on post-graduate intentions of dual and non-dual learners

An increase in age (26 years and older) for both groups increases the probability of remaining in the training company (or industry) after graduation compared to younger (16-19) respondents. Even though this finding differs from Gow *et al.* (2008), concluded that age is not a significant predictor of decisions regarding staying in a trade, other findings support our conclusion concerning the intentions of learners to stay in the industry (Laporte and Mueller, 2013; Xu, 2013; Wydra-Somaggio, 2021). Compared to those aged 30 or older, younger graduates are less likely to find jobs aligned with their majors (Xu, 2013). Career aspirations or limited professional experience could be contributing factors to this discrepancy (Wydra-Somaggio, 2021). In addition, research indicates that the probability of completing an apprenticeship program increases with age, peaking around age 41 before gradually declining (Laporte and Mueller, 2013).

Applying to the same industry is most common among non-dual respondents aged 20-25 (51.5%) (*Appendix E*). This is predictable since practice in traditional education does not lead to subsequent employment in a training enterprise. In the dual group, respondents aged 26 and older expressed a considerable degree of willingness to remain (67.4%). However, the differences among young people (>16-19) in the dual and non-dual groups are minor (36% and 33.2%). The high migration of young Kazakhstani people from rural areas to cities can also explain this phenomenon (Kenzhin *et al.*, 2016). The focus group results of this study also revealed the increase in employed workers' age and the unwillingness of young people to remain in the industry (specifically, agri-food) that corresponds to their major

Our study revealed statistically insignificant results regarding the influence of gender on the intentions of respondents, contradicting previous research findings (Forster-Heinzer *et al.*, 2016). Studying the completion behaviour of apprenticeship participants also found that males and females had equal chances of completing their programs (Laporte and Mueller, 2013). Bessey and Backes-Gellner (2015) suggest that a woman working in a mostly male workplace or a man working in a mostly female workplace will have an increased likelihood of dropping out. As 58% of the employed population in the agriculture sector of Kazakhstan is male and 42% is female (Bureau of National Statistics, 2023), we can state that in terms of gender characteristics, there is no strong predominance of one gender over the other, which might explain our results.

5.6.3 Influence of satisfaction factors on post-graduate intentions of dual and non-dual learners

The study revealed a strong association between practice experience satisfaction and intention to remain in the company (industry) for both dual and non-dual groups. Our results align with many studies examining the satisfaction dimension of apprentices or employee retention, suggesting that the satisfaction of apprentices is one of the factors that could predict their intentions to remain in the program or training company (Lee and Chao, 2013; Forster-Heinzer *et al.*, 2016; Seidel, 2019; Liu, 2021; Holtmann and Solga, 2023). According to our results, dual respondents have lower odds of leaving the company (industry) than non-dual respondents. Dual students are more exposed to the practice experience, spending about 60% of their time at the workplace and have the opportunity to master practical knowledge in a real production environment that can contribute to better academic performance (Doskeyeva *et al.*, 2024), deeper understanding of their chosen profession (Holzer and Lerman, 2014) and better job prospects afterwards (Haasler, 2020). Our results also indicate that dual learners satisfied with their educational institution studies are more likely to obtain careers aligned with their industry. This is facilitated by strong connections forged between educational institutions and businesses in DLS as involved businesses are actively engaged in both providing training materials and shaping curricula, thereby ensuring specialised training meets the dynamic demands of the labour market (Doskeyeva *et al.*, 2024).

5.6.4 Influence of motivational factors on post-graduate intentions of dual and non-dual learners

According to our results, non-dual respondents are willing to remain in the industry if they have a payment of (151000 KZT and more). Higher salaries also indicated that better-paid non-dual learners are more likely to seek opportunities outside the agri-food industry. This indicates that while higher pay may increase the likelihood of retention, it is not a sufficient condition on its own. Non-dual learners with higher salaries may have greater career ambitions, access to broader opportunities, or dissatisfaction with non-financial aspects of their work. More specifically, this may be attributed to the low payment level in Kazakhstan, where the income of agricultural workers in 2023 was only 242,000 KZT, the lowest among industries (Bureau of national statistics, 2023). While studies reveal that compensation (Lee and Chao,

2013), favourable pay increases (Xu, 2013; Beckmann, 2023), and post-training salaries (Dummert, 2021) significantly influence the decisions of apprentices to remain at their training establishments, Wagner and Wolf (2013) argue that salary is not the primary factor. This aligns with our results, suggesting that for apprentices, the potential for higher earnings after completing their studies is more important than the compensation they receive during the training period (Muehlemann and Wolter, 2020).

Increased satisfaction with employee retention initiatives (Job conditions, Relationships with colleagues, and Motivation) increases the odds of applying to the same industry for both groups. These findings align with the studies, indicating that relationships between peers (Masdonati, Lamamra and Jordan, 2010; Holtmann and Solga, 2023), work environment (Kossivi, Xu and Kalgora, 2016; Wydra-Somaggio, 2021), and motivation (Gow *et al.*, 2008; Donkor, 2012) strongly influence the intentions of apprentices to drop out. Non-dual respondents, however, also showed the likelihood of leaving the industry. One of the explanations might be a compensation amount, which could play a significant reason in leaving the sector.

Similarly to our findings, studies have shown that providing opportunities for career development can influence the decision of both dual and non-dual learners to remain in a training company (Lee and Chao, 2013; Smyth and Zimba, 2019; Smith *et al.*, 2021) However, dual respondents have a stronger effect than non-dual learners to leave the industry due to the lack of promotion opportunities. The majority of dual respondents of this study reside in rural areas, while most respondents in traditional education are primarily university and college students located in the city. (Ismukhanova *et al.*, 2020) highlight the differences between rural and urban residents, emphasising that the importance of career opportunities is higher for rural people. The notable shift of young people from rural areas to cities could also explain these findings (Kenzhin *et al.*, 2016).

5.7 Summary

This study examined the performance of DLS from the perspective of learners by comparing the satisfaction level with the learning environment (practice and study) between dual and non-dual learners and their intentions after graduation to remain or leave the agri-food industry.

Results indicated that DLS students and graduates have better practice experience and have higher intentions to remain in the industry corresponding to their major than learners of a traditional form of education.

The increasing age of respondents predicted remaining with the same company (industry) for DLS and TF groups. Gender characteristics showed no effect on the intentions of learners for both groups.

The DLS group showed a stronger association between practice experience satisfaction (including study satisfaction) and intention to remain in the company (industry) than the TF group.

Stronger links between compensation and intentions were found among TF respondents. Satisfaction with employee-retention initiatives has more influence on the choice to remain with the company (industry) for the DLS group rather than the TF group.

Promotion opportunities are more influential on dual learners in terms of intentions rather than for non-dual learners. The compensation rate and location of respondents explained this phenomenon.

Part III

This part provides an overview of the thesis by summarising the answers to the research questions regarding DLS performance from businesses' and learners' perspectives. It also presents the main findings and discusses the research limitations. Lastly, it offers policy implications, offering strategic guidance for improving the implementation of DLS in the agri-food sector.

Chapter 6. Summary and discussion of the main findings

6.1 Summary of the scope and the objectives of the research

This study examined the performance of DLS in the agri-food sector of Kazakhstan from the perspectives of both learners (students and graduates) and businesses. Through the lens of businesses, we sought the benefits that businesses derive from utilising DLS in comparison to traditional practice or ad-hoc training they use. This was achieved by investigating the motivation of businesses to participate in DLS, as well as their attitudes towards saving costs on training and addressing staff turnover. From the standpoint of learners (students and graduates), we assessed DLS performance through the comparison of satisfaction levels with training experiences among dual and non-dual learners. Additionally, the research aimed to identify the determinants influencing the decisions of dual and non-dual students and graduates to either remain with their current training business, transition to a different employer (business) within the same sector or pursue roles outside their field of specialisation (leave the business and sector).

6.2 DLS performance from the perspective of businesses

To examine the DLS performance from the perspective of businesses, this study answered the following research questions:

RQ1. What are the reasons for conducting training and benefits derived from the DLS compared to ad-hoc/traditional training?

Agribusinesses in Kazakhstan are experiencing a lack of personnel and an inconsistency between educational training and employer demands (Muhambetaliev and Kasymova, 2016). The promoted DLS approach promises to bridge the gap between theory and practical application by providing work-based training involving direct employer participation (*Rules for the organisation of dual training*, 2016). This enables employers to identify talented students and tackle shortages in staff and qualifications (Brinia, Stavropoulos and Athanasoula-Reppa, 2018). Nevertheless, businesses may also anticipate additional benefits from their involvement in DLS, viewing it as a solution to sector-specific challenges (Muehlemann *et al.*, 2007; Jansen *et al.*, 2015; Asghar, Shah and Akhtar, 2016; Chankseliani

and Anuar, 2019). The research question delves into the genuine motivations and advantages for agri-food enterprises engaging in DLS.

The relevance of this objective is underscored by the limitations of existing evaluation studies on investment motivations, especially when investments are made in generic skills, acquired through training programs like apprenticeships. Vroom's Expectancy theory underlined the conceptual framework in conducting qualitative research to understand the motivational forces of the employers of agri-food businesses in their decision-making processes to engage in DLS (Vroom, Porter and Lawer, 2005).

FGDs were conducted with dual and non-dual agri-food companies. Results showed that aside from qualification mismatch, the study unveiled additional reasons for the shortage of qualified workers in the agri-food sector. While there have been enhancements in the recruitment of specialists in dual businesses, young people are not willing to pursue careers in the agri-food industry. Businesses perceive that organising DLS requires much more investment rather than traditional training. The lack of secondary data on DLS organisational costs does not allow us to assess cost-effectiveness comprehensively. While some businesses may witness positive changes in staff turnover through the DLS, the impact tends to differ across business sizes.

RQ2. Do participating businesses consider the expense incurred in organising DLS higher than that from ad-hoc/traditional training?

Engagement requires effort and financial resources from the training company (Chankseliani and Anuar, 2019). However, in contrast to the traditional practice or ad-hoc training, businesses have the opportunity to achieve significant cost savings through the utilisation of the DLS in relation to employee training, retraining, and recruitment needs (Lewis, 2015; Asghar, Shah and Akhtar, 2016). This is because it enables the customisation of workforce development according to the specific requirements of businesses (Brinia, Stavropoulos and Athanasoula-Reppa, 2018). The main objective of the research question is to understand whether employers find the DLS approach a more cost-effective solution than ad-hoc training.

Conducted FGDs on dual and non-dual agri-food businesses allowed us to understand the cost elements associated with training personnel. Although training costs vary based on business size, scope, and frequency, results have shown that DLS businesses incur greater expenses than traditional practice or ad hoc training. Employers often see retained graduates as payoffs for training investments. However, both dual and non-dual businesses encounter

difficulties in effectively managing RIO calculations, which can impact their decision-making process.

RQ3. Have businesses experienced a reduction in staff turnover and improved graduate recruitment since becoming involved in DLS?

Researchers highlight the fact that graduates are increasingly intending to leave the agri-food industry (Kenzhin *et al.*, 2016). Youths from rural areas often move to cities to seek employment in industries that don't match their qualifications. Through DLS, businesses have better chances of increasing staff retention and professional recruitment as well as fulfilling their need for well-trained labour (Helper *et al.*, 2016)The main objective in answering this question is to understand how staff turnover has changed since DLS was implemented in businesses.

FGD results demonstrated that turnover among employees is common in small businesses (both dual and non-dual). According to the findings of this study, in comparison with ad-hoc training, DLS tends to enhance employee retention. Positive changes are reported by companies that have experienced employee turnover. Despite this, some enterprises did not observe any changes or found it difficult to respond. Small businesses find it useful to take advantage of dual training rather than ad-hoc training in order to find qualified specialists and reduce turnover, while both large and medium-sized enterprises see dual training as an opportunity for improving labour resources and view it as an addition to human capital development (Euwals and Winkelmann, 2004; Bishop, 2017).

The findings of this study also showed that significant improvements have been noted in hiring graduates, mainly in large and medium-sized businesses rather than in small businesses. Even though small businesses noted a positive impact of DLS on employee turnover, they remain dissatisfied with the quality of training provided to graduates (Hogarth *et al.*, 2012). Among the graduates of dual training and non-dual training, they do not perceive any significant differences in terms of their practical skills. It is expected that employers will give preference to the more competent candidate when choosing between two candidates (dual and non-dual) for the same position. Several large and medium-sized companies expressed appreciation for the training graduates received and their willingness to hire them. Graduates may experience differences in internships due to differences in the size of the company - larger companies usually provide more training opportunities and better training conditions than smaller companies (Kotey and Folker, 2007; Horn, 2016; Bishop, 2017).

6.3 DLS performance from the perspective of learners

The second part of the research examined the DLS performance from the perspectives of learners and answered the following research questions:

RQ4. Do DLS learners have a better practice experience than students and graduates of traditional training?

Student satisfaction plays a crucial role in examining the performance of apprenticeships and is closely connected to effective learning methods and positive educational experiences (Gow *et al.*, 2008; Lalioti, 2019; Böhn and Deutscher, 2021). DLS implementation is supposed to increase satisfaction by providing extensive hands-on experience, with a significant portion of study time allocated to practical training in the workplace (Jackson, Fleming and Rowe, 2019; Tastanbekova *et al.*, 2021). The collaboration between educational institutions and businesses, more extensive practice hours and the direct involvement of employers in the educational process ensures a well-structured curriculum that facilitates the immediate application of theoretical learning (Jjuuko, Tukundane and Zeelen, 2021). Additional support such as mentor guidance, practical hours recognised as work experience, job opportunities during training, financial compensation, and post-graduation job security further may enhance attractiveness and satisfaction levels among learners (Bishop, 2017; Mulkeen *et al.*, 2019; Howe *et al.*, 2023). The main objective behind asking this question was to examine if learners in DLS are more satisfied with their learning than students and graduates in the traditional form of education. This study used Kirkpatrick's learning evaluation model (Level 1) for constructing questions, which proved to be one of the most adaptable and effective methods for assessing training effectiveness (Kirkpatrick and Kirkpatrick, 2016).

Dual students showed a higher satisfaction experience level with practice than traditional (non-dual) students. However, the comparison of dual and non-dual graduates indicated different results, showing non-significant differences between the groups in many dimensions. This may be explained by the relatively recent introduction of DLS to businesses still developing their practice organisation processes at workplaces. The lack of internship placements, as well as the small staff capacity of the companies, prevents all graduates from being employed at the internship site. DLS companies may negatively impact the satisfaction levels of graduates if they fail to meet the requirements of work-based practice (Umeokafor *et al.*, 2021). The comparison of all learners (students and graduates) that were part of the DLS and TF groups found that the DLS group showed greater satisfaction with the practice experience than the TF group.

The next research question examined the post-garduation employment prospects of students and graduates:

RQ5. What factors impact the intention of dual and non-dual learners to remain in the training company (industry), change the employer within the same industry, or leave the industry?

The main objective associated with the question is to examine if DLS students and graduates intend to remain in the industry (employer) after graduation. The retention and recruitment of dual graduates serve as a pivotal indicator of DLS performance (Valiente and Scandurra, 2017). The uncontrolled migration of young people from rural areas (Kenzhin *et al.*, 2016) raises concerns about them quitting the industry. DLS completion is supposed to provide graduates with secure employment in their respective industries (Donkor, 2012). Graduates should have greater opportunities to be hired by the companies where they completed their practice (Kocsis and Pusztai, 2021) or to apply to another employer in the same industry, which is also considered a good outcome and demonstrates DLS performance in preparing qualified staff for the industry (Doskeyeva *et al.*, 2024).

We examined factors that influenced respondents' intention to remain with the employer they had practiced (Y=1), to change the employer in the same industry (Y=2), or to leave the industry (Y=3). Due to several outcomes with no natural ordering, MNL was used to identify factors that affect respondents' employment prospects after graduation. Demographical, satisfaction and motivational dimensions were used in the model.

Testing demographical variables (age, gender)

The increasing age of respondents predicted remaining with the same company (industry) for DLS ($b = -2.034$, $p = 0.001$). Older TF respondents also less likely move to other industry ($b = -1.151$, $p = 0.049$) compared to young respondents. However, all ages in the DLS group showed a higher intention to remain with the employer than the TF group. Young people aged 16-25 in the TF group have more chances (20.2% and 23.4%) to quit the industry after graduation than respondents of the DLS group (16.7% and 19.2%). Gender characteristics, however, showed no effect on the intentions of learners for both groups.

Testing satisfaction variables (practice satisfaction, study satisfaction)

Both DLS and TF groups showed a strong association between practice experience satisfaction and intention to remain in the company (industry) - the higher the satisfaction, the lower the likelihood that they will depart from the industry. A comparison of both groups,

however, indicated that DLS group respondents have lower odds (RRR=0.713, p=0.000) of leaving the industry than TF group learners (RRR=0.813, p=0.000).

Testing motivational variables (salary, promotion, employee-retention initiatives)

Salary variable was significant for TF respondents only. A higher salary of 151000 KZT and more during practice decreases the probability of changing employer in the same industry (b = -0.849, p = 0.002) or leaving the industry (b = -0.725, p = 0.054) compared to those who are not paid. Lack of promotion increases the likelihood of TF learners switching employers (b = 0.769, p = 0.001) or leaving the industry (b = 1.216, p = 0.000), affecting employment stability. Dual learners are more likely than non-dual learners to leave the industry due to lack of promotion (RRR = 3.667). Both DLS and TF learners showed a significant positive relationship between employee retention initiatives and intention to remain. Dual learners are more likely to remain in the industry (b = 0.353, p = 0.035), while non-dual learners may still leave (b = 0.353, p = 0.013).

6.4 Discussion of main findings

6.4.1 Findings on DLS performance from the perspective of businesses

Several reasons contribute to the shortage of qualified personnel in the agri-food industry

The agri-food sector in Kazakhstan remains vulnerable to labour shortages. Low communication between education and the labour market caused a discrepancy between the knowledge acquired at educational institutions and the qualifications required by employers and served as the main reason for DLS introduction. The study further revealed additional reasons contributing to the shortage of skilled labour in the agri-food sector, bringing to the forefront challenges that exist within the industry. Among these challenges is the lack of desire among young individuals to work in the agri-food sector, resulting in the predominance of aged workers in this sector. Largely, this is due to low wages in the agri-food sector causing the outflow of young specialists into the higher-paid sectors.

DLS requires a substantial investment than traditional practice /ad-hoc training

Analysing cost elements revealed that DLS is an expensive form of training compared to traditional practice or ad-hoc training. Nevertheless, businesses are willing to make these investments since they believe that these investments pay off in full through the hiring of students for employment and the obtaining of qualified workers after their graduation without the necessity of additional training and retraining. However, businesses struggle to evaluate

the benefits (for example, ROI calculations) associated with involvement in dual and non-dual training.

Businesses do not practice analysing cost-benefit from training

Businesses encounter difficulties when it comes to providing data for cost-benefit analyses as a result of the absence of distinct cost accounting specifically for DLS and ad-hoc training, An illustration of this challenge can be seen in scenarios where businesses procure equipment and materials intended for both their employees and students within a single transaction. Moreover, it is important to note that the outcomes of training initiatives do not always translate directly into changes in sales volume, productivity, or other profit-related metrics, mainly due to the presence of other factors that can impact these parameters, which also add additional difficulties in cost-benefit calculations.

DLS performance on turnover varies according to the size of the businesses

Employee turnover is a common occurrence in small businesses, whether they are dual or non-dual. Dual training, as opposed to ad-hoc training, has a tendency to improve employee retention in dual businesses (mainly for small ones). However, for a small establishment, DLS serves as a temporary solution for recruiting employees (students) during the training period, while for large and medium-sized businesses, DLS provides additional staff recruitment and HR development opportunities giving them a greater opportunity to recruit graduates than small businesses.

Employers do not yet consider DLS graduates to be advantageous

DLS offers students an advantage through practical training, which counts as work experience and can be valuable when applying for jobs. There is, however, no consensus among managers that a dual graduate is better prepared than a traditional graduate. Enterprises remain sceptical about the level of qualifications of graduates due to uncertainty regarding the organisation of dual training programs in other companies. This may be attributed to the difference in the level of training in SMEs and large businesses. There may not be sufficient equipment in a small business to develop the necessary skills, while large companies have more opportunities and conditions to conduct high-quality training. It refers again to the absence of standards and requirements pertaining to the availability of the appropriate conditions and equipment for conducting DLS.

6.4.2 Findings on DLS performance from the perspective of learners

DLS learners are more satisfied with the practice experience than traditional learners

DLS students are more exposed to the practice experience, spending about 60% of their time at the workplace and have the opportunity to master practical knowledge in a real production environment. Compared to non-dual learners, dual students have better chances to apply their theoretical knowledge into practice and to be employed in part-time jobs during practice, which counts as work experience. Participation of employers in study programs helps to train future specialists that meet labour market requirements, affecting graduates' employment prospects. All these benefits can explain the high satisfaction level of DLS learners.

Current DLS learners are more satisfied with the training approach than the former ones

Satisfaction of graduates with practice differs from that of students - no significant difference in satisfaction level between dual and non-dual groups. This result is explained by the fact that not all companies participating in the DLS can meet the requirements for conducting work-based learning, which may adversely affect learners' satisfaction. This could refer to the problems associated with dual education legal regulation. Thus, current regulations mainly deal with the organisation of DLS in colleges, not enterprises. Companies participating in DLS are not subject to clear requirements or standards, particularly in terms of practice conditions and the number of positions offered to students. The companies participating in focus groups mentioned a large influx of students that did not correspond to the size of the organisation.

DLS learners express more intention to remain in the industry than traditional learners; however, the difference between the groups is small

Young people in the DLS group have fewer chances to quit the industry; however, the difference in the results between the dual and non-dual groups was small. The results can be explained by the tendency of young people to move from rural areas to cities due to low wages, which is consistent with the results of the focus group discussions. This provides support for our findings that DLS respondents place a higher priority on salaries than promotion opportunities. In spite of this, it appears that being paid during practice increases the intention to remain for both groups, with a slight advantage for DLS learners (they have fewer chances of leaving the industry compared to traditional learners). Intentions to remain for DLS learners are also influenced by practice, study experience, and employee-retention initiatives, which could be explained by deeper exposure to the practice in the DLS approach.

6.4.3 Emphasising contextual novelty and sectoral realities in Kazakhstan

While much of the existing literature on the DLS has focused on developed, high-income economies such as Germany, Austria, and Switzerland, this study brings a unique contribution by exploring the implementation and performance of DLS in Kazakhstan, a country that is both post-Soviet and middle-income, with distinct socio-economic and institutional characteristics. The novelty of this research lies in its contextualisation, where the DLS is trying to be adapted into a setting that does not possess the same institutional legacy or infrastructural development as the Western contexts. Kazakhstan's attempt to follow the German model illustrates the challenges of adopting international best practices in a setting marked by an underdeveloped vocational education infrastructure.

The agri-food sector in Kazakhstan further amplifies these contextual differences. Historically shaped by the Soviet Union economy and its subsequent transition, the sector is now characterised by a dualism between modern agribusinesses and smallholder or subsistence farms. Many of these enterprises lack the capacity or incentive to invest in long-term training programs as DLS. Furthermore, rural depopulation, ageing infrastructure, and regional disparities exacerbate the implementation challenges.

These systemic and structural issues underscore the importance of adapting DLS to the local context rather than implementing a wholesale import of this system. For instance, employers or students may perceive DLS participation as burdensome due to logistical, financial, or organisational constraints. Learners, especially those in rural or remote areas, may not have access to the same quality of placements or mentoring as their urban counterparts. These may impact both the learner's satisfaction and their post-graduation intentions, as revealed by this study's findings. Therefore, interpreting the results of DLS effectiveness in Kazakhstan must be grounded in a thorough understanding of these contextual specificities.

6.5 Research limitations and future research

One of the limitations of this study is the incapacity to conduct an in-depth cost-benefit evaluation between DLS and traditional training approaches. The study did not delve into such an analysis due to its scope limitations. Consequently, it relied on the overall perceptions of businesses concerning the costs linked to DLS as opposed to ad-hoc or traditional training methods. Future research in the agri-food sector could focus on conducting a comprehensive cost-benefit analysis by collecting relevant information from dual and non-dual businesses, as well as their employee turnover rates and/or retention levels, for a deeper understanding of the

DLS effectiveness. Such types of study are equally required for other sectors where the skill gap is evident and could do with participating in DLS.

In terms of learners, there might be other variables influencing career choices that were not considered in this study. For instance, the academic performance of students, the influence of their parents on career choice, and the location of the students were not included. Considering students and graduates separately for each group would provide a deeper understanding of their intentions. The DLS can also be assessed more comprehensively by incorporating data from educational institutions. This study combines colleges and universities in DLS. It would be useful to consider the DLS performance in TVE and higher education separately.

Chapter 7. Implications for management and policy design

7.1 Management implications for businesses

Evaluation of training effectiveness

Evaluating the effectiveness of the learning process is essential for building an effective learning system, yet many businesses often fail to conduct systematic training assessments. Despite hiring skilled personnel, some dual businesses do not prioritise DLS graduate qualifications over those of traditional students. The distinction in the quality of training received by dual graduates frequently relies on the resources and equipment available at the enterprises where they undergo their training (Bishop, 2017). Also, the learning environment in small businesses tends to be less formal than those in large businesses, as large and medium-sized businesses are usually able to provide a more conducive learning environment (Kotey and Folker, 2007). This research introduces a method of assessment based on the Kirkpatrick training learning evaluation model, which could be a useful tool for DLS evaluation. Based on the division of the learning process into reaction, learning, behaviour, and results, companies could adapt the methods that are based on this model in aggregate or separately to obtain feedback on how to organise training effectively and determine the impact of new skills in the workplace. The application of this practice by businesses will contribute to the improvement of the training program in the future.

Agribusiness specifics consideration in DLS

As a characteristic of the agri-food industry, seasonality might potentially impact staff turnover and ineffective training (Devereux and Longhurst, 2010). For instance, in winter[8], climatic conditions often lead to the suspension or reduced capacity of most production activities. Given that traditional education practice hours align with the general curriculum, a close collaboration with educational institutions in DLS would facilitate incorporating the seasonality aspect into the design of practical training hours (Jahan and Shonchoy, 2018). This

[8] Kazakhstan experiences a pronounced continental climate, with limited agricultural activities being possible during wintertime.

would enable the accommodation of additional labour needs during peak harvest periods or other fieldwork activities and contribute to a better student learning experience.

Encourage businesses to conduct a cost-benefit analysis

According to our results, it is challenging for employers to provide data for cost-benefit analyses due to the lack of separate cost accounting for training (Gambin and Hogarth, 2016). For instance, businesses can purchase consumable materials for a laboratory for employees and students in one transaction. Furthermore, training does not necessarily lead to changes in sales volume, productivity, or other business profit measures since many other factors can influence these parameters (Asghar, Shah and Akhtar, 2016). When businesses fail to effectively assess and communicate the tangible benefits derived from training programs, it creates uncertainty about the value of such investments and can serve as a deterrent for them contemplating investment in employee development (Muehlemann and Wolter, 2014). This makes cost assessment and communication of training program benefits essential to instil confidence in decision-makers and encourage strategic investments in employee development (Das and Baruah, 2013). Policymakers can encourage employers to use cost-benefit assessment tools for training investments through several strategies, such as mandating businesses clear cost accounting for training, making it easier to identify and evaluate training investments. They can also offer financial incentives, such as tax breaks or subsidies, for companies that adopt these tools. Providing businesses with standardised, easy-to-use assessment frameworks and offering training on how to apply them effectively can help. For example, several European countries, including Germany and Switzerland, have experience in providing representative and periodic data on the costs and benefits of apprenticeship training, which can be used to make policy decisions on a broader scale (Muehlemann and Wolter, 2014). Several cost-benefit assessment tools are also being employed. One example was developed by the Swiss Federal University for Vocational Education and Training (SFIVET) to support the revision of occupational curricula by incorporating real-time simulations (CEDEFOP, 2014). Additional ideas for data collection can be drawn from an extensive study conducted in the UK identifying the costs and benefits employers derive from different levels of apprenticeships in the UK (Hogarth *et al.*, 2012). Apart from determining the costs and benefits of providing workplace learning, the study sought information from participants about why they invested in these programs, how the decision to invest in them was made, and what benefits they perceived from their investment.

7.2 Policy implications for authority bodies

Based on the conclusions drawn from the study, the following recommendations emerge:

Incorporation of data collection on DLS performance indicators

Monitoring the DLS performance requires periodic collection of statistical data on the main indicators. According to the statistics available at the time of conducting this research, the number of colleges, enterprises, and students involved in dual education by industry is equally distributed across all regions of Kazakhstan (NCE, n.d.). Existing statistics, however, do not capture employment and working out data on students in a DLS, nor reflect data by industry. Having this information will be useful for monitoring the effectiveness of the implementation of the system and conducting further research on the effectiveness of DLS. As an example, apprenticeships in Europe are combined into a single database of apprenticeship schemes, which gathers and presents not only structured, comparable information on apprenticeship schemes, but also key indicators such as the number of students by age, the cost of training for enterprises, the number of workers with skills corresponding to their duties, and other important indicators (CEDEFOP, 2021). Also, efforts should be made to assist businesses in providing data or feedback on DLS organisations. This can be achieved by implementing regular surveys conducted by responsible entities, such as NCE, the costs associated with organising DLS, the number of dual graduates hired, employee turnover rate or/and insights into the benefits and challenges of organising dual training approach at the workplace could be collected from businesses. Existing NCE questionnaires are aimed at assessing the knowledge and skills of students on the part of work-based trainers rather than at the reaction of dual businesses to the DLS. The analysis of the collected information can yield interim reports on the efficacy of dual training, helping in identifying necessary financial incentives to encourage increased business participation and engagement.

Emphasis should be placed on the development of human capital in the agri-food sector

The agri-food sector requires comprehensive actions for human capital development that encompasses not only economic and educational aspects but also social elements. The recent *Concept of development of the agro-industrial complex of the Republic of Kazakhstan for 2021 - 2030* (2021) aims to improve labour productivity, attract investments, and raise the income of rural residents. Nevertheless, drawing conclusions on the outcomes is premature at the present time. Before this current concept, some programs were implemented in Kazakhstan to improve the living standards of rural residents. However, these efforts have not yielded significant results, and the socioeconomic infrastructure in rural areas remains underdeveloped

(Khalitova, Nurymova and Dusebaeva, 2023). The emphasis should be on enhancing rural infrastructure, potentially leading to the generation of more job opportunities and increasing the incentive for young individuals to engage in rural areas. Given the inefficacies and oversights of past programs, the Government should contemplate integrating measures to enhance rural infrastructure into the existing concept for the development of the agro-industrial complex. For example, Kazakhstan's "With a Diploma to the Village"[9] program (Teslenko, 2023) aims to strengthen rural human capital by attracting skilled specialists, but the initiative has not yielded significant results. According to the Economic Research Institute (ERI, 2022), one of the primary challenges is substandard housing, which is often poorly maintained and lacks essential amenities such as central heating. While the program's concept is promising, its success hinges on improving infrastructure and housing conditions to make rural areas more appealing to young professionals. In addition, it is important to comprehend the genuine reasons behind the disinclination of young individuals to retain in the agro-food sector. Although, students constitute an integral component of the DLS, a comprehensive analysis involving all participating parties, businesses, educational institutions, and students will help determine the main factors influencing unemployment in the industry. This understanding will subsequently facilitate the formulation of targeted measures.

Initiatives for small businesses in the agri-food sector for trainee retention

Incentives for small businesses hiring dual graduates could promote their value and reduce youth unemployment. According to current *Rules for the organisation of dual training* (2016), DLS provides students compensation, recognised qualifications, and practical skills counted as work experience. Thus, current incentives primarily support graduates' acquired expertise in specialised fields rather than rewarding the businesses that invested in their training. The findings of this study suggest that small businesses, which are particularly reliant on specialists, do not experience significant benefits from DLS. Covering mentor costs (which is only an initiative for businesses (*Rules for the organisation of dual training*, 2016) does not save the situation. Consequently, providing a stimulus for small businesses to be involved in DLS is imperative. This could be retaining dual graduates in the training company for a certain

[9] The program aims to provide social support measures that allow specialists who live and work in rural areas to solve the main issue - housing acquisition on preferential terms. The main requirement for the recipient is the commitment to work for at least three years in the relevant speciality in an organisation located in this rural settlement.

period after graduation and continue contributing to the company that provided training. This secure employment may increase the interest among SMEs and large businesses.

Another initiative could be subsidies for SMEs that can offset the costs associated with DLS, making it more attractive for firms to participate. Research indicates that 60% of firms in Switzerland experience negative net costs from training, suggesting that financial incentives could further encourage participation (Muehlemann *et al.*, 2007) and stimulate training activities (Schuss, 2023).

Implementation of DLS regulations for businesses

Existing *Rules for the organisation of dual training* (2016) and *Rules for organising dual education in organisations of higher and/or postgraduate education* (2023) are more concerned with regulating the activities and functions of the parties involved in the process of organising DLS. As of today, there are no clear standards or requirements for enterprises participating in DLS to train students. It is imperative to formulate regulatory standards that ascertain the alignment of employers of businesses expressing interest in participating in DLS with specific requirements and the provision of adequate equipment to facilitate quality training in the workplace, as currently, the legal framework for dual education in Kazakhstan primarily focuses on regulating the activities of colleges rather than enterprises (Doskeyeva *et al.*, 2024). These standards should encompass the presence of qualified personnel capable of offering mentorship, along with guidelines on the acceptable number of students corresponding to the size of the businesses.

In countries with well-established apprenticeship programs, all activities in work-based learning are clearly regulated by relevant legislation and authorities. In Germany, for example, a company's "training competence" is determined by its suitability as a training centre and whether it employs instructors who meet the necessary personal and professional qualifications. The competent authorities are responsible for verifying this "competence" (BIBB, 2014). Furthermore, the United Kingdom has developed guidelines for training providers that wish to offer apprenticeships that explain the basic steps to provide high-quality training. A self-assessment tool is included as part of the guide that training providers can use to plan and identify areas for improvement, as well as access additional relevant guidance and information (*Provider guide to delivering high-quality apprenticeships*, 2023).

DLS platform for involved parties

To effectively implement DLS, it would be useful to create a single database, where all educational institutions and colleges offering dual learning are registered, along with information about the positions and specialities provided to make potential students aware of the existing opportunities. The dual learning program currently involves students entering into a dual learning agreement with an enterprise that has an agreement with the college. Therefore, students generally do not have the option of choosing a training organisation. An integrated platform will give students access to a wide range of opportunities in the DLS, enabling them to choose training enterprises and positions and get career advice and guidance that can help students make decisions about learning and future employment. These services also may assist students in finding apprenticeship opportunities according to their education level, interests, and specialisations. Businesses and colleges will also benefit from this since it will create a competitive environment for hiring potential employees.

7.3 Summary

This section highlights the distinct priorities for businesses and government authorities in Kazakhstan regarding the implementation of the DLS. While businesses should seek practical benefits such as providing quality training, retaining skilled graduates and training costs, government authorities should focused on fostering economic development and addressing youth unemployment, particularly in sectors like agribusiness. The recommendations outlined above emphasise the need for both parties to collaborate more closely through improved data collection targeted financial incentives, and the establishment of clear regulatory standards for enterprises. Implementing these strategies within a reasonable timeframe is critical for the DLS to effectively address the challenges faced by the workforce in Kazakhstan. These measures will not only enhance the system’s effectiveness but also contribute to increased labour productivity across sectors, particularly in the agri-food industry. By ensuring the proper development of human capital and offering stronger support for SMEs, the DLS can play a pivotal role in promoting economic growth, improving rural infrastructure, and strengthening Kazakhstan's position in the global economy.

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Appendix A

Description of participated businesses in FGDs

Study reference	Dual companies	Study reference	Non-dual companies
Focus group 1			
F1D1	Type of activity: • Professional, scientific and technical activities • Cultivation of cereals and leguminous crops, including seed production; • Mixed agriculture • Repair and maintenance of machinery and equipment for agriculture and forestry Number of employees: 251-500 (Large)	**F1N1**	Type of activity: • Processing and preservation of poultry meat • Breeding poultry for meat, breeding poultry and young Number of employees: 501-1000 (Large)
F1D2	Type of activity: • Wholesale of agricultural machinery, equipment and spare parts • Repair and maintenance of machinery and equipment for agriculture and forestry Number of employees: 151-200 (Medium)	**F1N2**	Type of activity: • Processing and preservation of poultry meat • Production of crude oils and fats • Manufacture of prepared feed for animals kept on farms • Fertilizer production Number of employees: 201-250 (Medium)
F1D3	Type of activity: • Wholesale of grain, seeds and animal feed • Wholesale of spare parts and accessories for cars • Wholesale of pesticides and other agrochemical products Number of employees: 101-150 (Medium)		
F1D4	Type of activity: • Bread production; production of fresh flour confectionery, cakes and pastries Number of employees: <50 (Small)		

F1D5	Type of activity: • Wholesale of agricultural machinery, equipment and spare parts • Repair and maintenance of machinery and equipment for agriculture and forestry Number of employees: 151-200 (Medium)		
Focus group 2			
F2D1	Type of activity: • Research and development in the field of natural sciences and engineering Number of employees: <50 (Small)	**F2N1**	Type of activity: • Research and development in the field of natural sciences and engineering Number of employees: <50 (Small)
F2D2	Type of activity: • Veterinary Number of employees: <50 (Small)	**F2N2**	Type of activity: • Research and development in the field of natural sciences and engineering Number of employees: <50 (Small)
F2D3	Type of activity: • Veterinary Number of employees: <50 (Small)	**F2N3**	Type of activity: • Veterinary Number of employees: <50 (Small)
F2D4	Type of activity: • Crop and animal husbandry, hunting and provision of services in these areas Number of employees: <50 (Small)	**F2N4**	Type of activity: • Manufacture of electrical distribution and control equipment (without repair) Number of employees - 101-150 (Medium)
F2D5	Type of activity: • Special equipment sale, leasing, rent, spare parts, repair and maintenance Number of employees: <50 (Small)	**F2N5**	Type of activity: • Veterinary Number of employees: 151-200 (Medium)
Focus group 3			
F3D1	Type of activity: • Cultivation of grain and leguminous crops, including seed production, • Breeding of dairy cattle Ancillary activities for breeding animals Number of employees: 41-50 (Small)	**F3N1**	Type of activities: • The cultivation of grain, legumes and oilseeds, seed production, breeding of cattle and horses milk production Number of employees: 51-100 (Small)

Appendix B

Focus group discussion questions

The facilitator gives a brief introduction to the research.

Opening questions:

1. Tell us your name and the name of your company/industry.
2. How long have you been involved in the DLS/ How often do you organise ad hoc/traditional training?

Introduction questions:

3. Tell us about the employment (turnover) situation in your company.
4. Is your company experiencing a shortage of qualified staff? (if yes, could you state that it was one of the main reasons for involvement in the DLS and ad hoc/traditional training?)

Transition questions:

5. Think back to when you first became involved with DLS or organised training for your staff. Tell us about your experience: Why did you decide to organise the training (there may be other reasons besides those listed above.)? Was this process easy? What problems did you face?

Key questions:

6. What are the main benefits you see in participating in DLS or organising ad hoc/traditional training for staff in your company?
7. What changes in employment situation (ex., turnover, hiring specialists) have you noticed while or after involvement in the DLS or ad hoc/traditional training?
8. Tell me about your experience hiring DLS/traditional graduates (To what extent do you satisfy the qualification level of graduates? Do you feel they are willing to remain in your company for an extended period? Why?).
9. Tell me about the cost of organising the DLS/ad hoc training. (Are the costs of organising DLS/ad hoc/traditional training at your company justified? Did you make an RIO justification calculation?)
10. Considering your experience, what would you prefer: to organise periodic ad hoc/traditional training or DLS? Why?

Ending questions:

11. What kind of assistance or support from the authority bodies does your enterprise need in organising DLS or ad hoc/traditional training?
12. What would you recommend to increase the number of involved enterprises in the DLS?

Appendix C

A questionnaire conducted with learners

Introduction

1. Enter your date of birth to generate a unique number

_____

2. What is your age range?
<16 and younger
17-19
20-22
23-25
26> and older

3. How would you describe your gender?
Male
Female
Prefer not to say

4. What is your marital status?
Single
Married
Divorced
Prefer not to say

5. What describes you best at the moment? (By traditional form of study, we mean regular full-time study at a college or university)
Current Student in the Traditional Form of Education
Graduate of a Traditional Form of Education
Current Student in a Dual Education program
Graduate of a Dual Education program

6. Based on the experience gained and the relevant training you have received, how would you define your speciality?
My speciality is/was _____

7. Which college or university are you studying at/have you graduated from?
The name of the College/University is _____

8. Provide the name of the company where you received practical training or have a placement for practice.
The company's name is _____

9. Are you employed?

Yes
No

10. How difficult or easy was it to apply for your current job position? Please place the bar in the correct position.

	Extremely easy	Very easy	Easy	Neither easy nor hard	Difficult	Very difficult	Extremely difficult
	1	2	3	4	5	6	7
Rate from 1-7							

11. At which level does your work relate to your speciality?

	I work in a completely different field	My job is less related to my specialty	My job is slightly related to my speciality	My job is more or less in line with my speciality	My job is more in line with my speciality	My job is mostly connected to my speciality	My work is entirely consistent with my specialty
	1	2	3	4	5	6	7
Rate from 1-7							

If greater than or equal to 2, get question 14
If less than or equal to 2, get question 10

12. Are you planning to find a job that is related to your speciality?
Yes
No

If "No", get question 13.
If "Yes", get question 14.

13. Write the main reason in the field below:
I am not planning to find a job related to my speciality because _____

14. Are you experiencing difficulties in finding a job at the moment?
Yes
No

If "No", get question 16.
If "Yes", get question 15.

15. What difficulties do you experience in finding a job at the moment? (You can choose more than one)
Health issues
Other personal issues
Lacking the qualifications or diplomas
My skills were considered too low
Lack of relevant work experience
Other reasons_____

Reaction to practice and training

16. How satisfied are/were you with the recruitment process on the job training and professional skills developmental trajectory practice in the company?

Completely dissatisfied 1	Mostly dissatisfied 2	Somewhat dissatisfied 3	Neither satisfied nor dissatisfied 4	Somewhat satisfied 5	Mostly satisfied 6	Completely satisfied 7
Rate from 1-7						

17. Have you been or are you able to apply the theoretical knowledge you gained in college into practice consistently and logically?

The theoretical material has/had significant disagreements with its practical application 1	The theoretical material mostly has/had disagreements with its practical application 2	The theoretical material has/had some disagreements with its practical application 3	The theoretical material is more or less linked to its practical application 4	The theoretical material somewhat links/linked its practical application 5	The theoretical material logically and thoroughly links/linked its practical application 6	The theoretical material logically and completely links/linked its practical application 7
Rate from 1-7						

18. Do/Did you actively engage in activities and tasks related to your role and responsibilities?

Never 1	Almost never 2	Rarely 3	Occasionally 4	A moderate amount of time 5	Almost every time 6	Every time 7
Rate from 1-7						

19. Rate the usage opportunity of necessary equipment and technology in the practice workplace (for example, during preparation for your assignments)

Never 1	Almost never 2	Rarely 3	Occasionally 4	A moderate amount of time 5	Almost every time 6	Every time 7
Rate from 1-7						

20. How satisfied are/were you with the support of the company's supervisor (head of the practice)?

	Extremely dissatisfied	Mostly dissatisfied	Somewhat dissatisfied	Neither satisfied nor dissatisfied	Somewhat satisfied	Mostly satisfied	Extremely satisfied
	1	2	3	4	5	6	7
Rate from 1-7							

21. Are you satisfied with the quality of teaching (or guidance and support) in the workplace where you had/have practised?

	Extremely dissatisfied	Mostly dissatisfied	Somewhat dissatisfied	Neither satisfied nor dissatisfied	Somewhat satisfied	Mostly satisfied	Extremely satisfied
	1	2	3	4	5	6	7
Rate from 1-7							

22. Does/Did your practice company (employer) provide you with any support (help with providing documents for your report, provision of an equipped workplace, payment, reward for merits or achievements or any service related to practice)?
Yes
No

If "No", get question 24.
If "Yes", get question 23.

23. What kind of support do/did you receive from the company during your practice? (You can choose more than one)
Provision of an equipped workplace
Paid work
Provision of the necessary materials (documents) for the assignment and report
Strong support from the supervisor or practice leader
Employment opportunities after graduation
Support from colleagues in achieving tasks
Reward for merits or achievements
Other_____

24. What has been the most beneficial experience during the training period in the company? (You can choose more than one)
Organisation of practice in the workplace
Teaching methods and quality
Communication with the team
Paid work
Involvement in the work process
Employment opportunities after graduation
Acquiring good practical skills
Other_____

25. What would you advise to change in your role and responsibilities during your internship in the company to make it more beneficial for your future career? (You can choose more than one)

Be more involved in the work process (in the production process)
More attention from the supervisor (head of practice)
Improve material and technical equipment for students at the enterprise
Job placement assistance
The enterprise should be more interested in the needs of students
Enterprise needs to improve the organisation of training in the workplace
Other_____

26. Evaluate the organisation of Education in College/University

	Extremely dissatisfied 1	Moderately dissatisfied 2	Slightly dissatisfied 3	Neither satisfied nor dissatisfied 4	Slightly satisfied 5	Moderately satisfied 6	Extremely satisfied 7
How satisfied are/were you with the teaching and learning quality in College or University							
Evaluate the provision of educational and methodological material.							
How satisfied are/were you with the training in the College/University as a whole?							

27. Did/Does practice meet your expectations?

	Much less than expected 1	Less than expected 2	Slightly less than expected 3	Matched expectations 4	Slightly exceeded expectations 5	More than expected 6	Greatly exceeded expectations 7
Rate from 1-7							

28. Are you familiar with the professional standard of your speciality?

Yes
I have heard about it but do not know all the aspects
No

29. What did you like about the training in College or University? (You can choose more than one)
Teaching quality
Educational and methodological base
Organisation of dual education
Library
Comfortable learning environment
Educational program
Assistance in the employment of graduates
The possibility to apply skills in the work environment
Other _____

30. What would you advise changing the training in college or university? (You can choose more than one)
Teaching quality
Educational and methodological base
Organisation of dual education
Library
Learning environment
Educational program
Assistance in the employment of graduates
Material and technical base
Other _____
End of Block: Reaction on practice and training

Start of Block: Questions for Graduates of Dual program and Traditional form of Education

31. What better suits your future plans?
Remain with the company where I work now
Apply for another job in the same industry
Find a job in another industry
N/A (Currently, I do not have a job)

If "NA", then the respondent finishes their survey.

32.1 Which reason affected your choice to remain with the company? Please select all that apply.
Salary size
Promotion opportunities
Work conditions
Relationship with colleagues
My motivation and ambitions
Other _____

32.2 Which reason affected you when applying for another job in the same industry? Please select all that apply
Salary size
Promotion opportunities
Work conditions
Relationship with colleagues

My motivation and ambitions
Other _____

32.3 Which reason affected you in finding a job in another industry? Please select all that apply.
Salary size
Promotion opportunities
Work conditions
Relationship with colleagues
My motivation and ambitions
Other _____

33. Could you please provide us with an approximate estimate of your salary after tax?
No more than 50 000 KZT per month
50 000 – 100 000 KZT per month
100 000 – 150 000 KZT per month
More than 150 000 KZT per month

34. Considering your relevance and qualifications, are there any promotion opportunities for you in the company you practised?
Yes
No

35. How satisfied were/are you with the work conditions in the company?

	Extremely dissatisfied	Moderately dissatisfied	Slightly dissatisfied	Neither satisfied nor dissatisfied	Slightly satisfied	Moderately satisfied	Extremely satisfied
	1	2	3	4	5	6	7
Rate from 1-7							

36. Rate your relationship with colleagues

	Terrible	Poor	Very poor	Fair	Good	Very good	Excellent
	1	2	3	4	5	6	7
Rate from 1-7							

37. Your motivation level to work with the company more states one of the following:

	Extremely unmotivated. I will not work in this industry. I will try myself somewhere else	Moderately motivated. I will remain, but not for a long time	Slightly unmotivated. I need to remain to earn money	Neither motivated nor unmotivated.	Slightly motivated. The work is convenient for some reasons	Moderately motivated. I see some good opportunities.	Extremely motivated. Opportunities for promotion and having a good salary
	1	2	3	4	5	6	7
Rate from 1-7							

End of Block: Questions for Graduates of Dual program and Traditional form of Education

Start of Block: Questions for Students of Dual program and Traditional form of Education

31. What better suits your future plan after completing your studies?
Remain with the company where I had/have practice
Apply for another job in the same industry
Find a job in another industry

32.1. Which reasons had an impact on your decision to remain with the company? Please choose all that apply.
Salary size
Promotion opportunities
Work conditions
Relationship with colleagues
My motivation and ambitions
Other _____

32.2 Which reasons motivated you to apply for another job in the same industry? Please choose all that apply.
Salary size
Promotion opportunities
Work conditions
Relationship with colleagues
My motivation and ambitions
Other _____

32.3 Which reason affected you in finding a job in another industry? You can choose several options.
Salary size
Promotion opportunities
Work conditions
Relationship with colleagues
My motivation and ambitions
Other _____

33. Are you paid for your practice work?
Yes
No

34. Could you please provide us with an approximate estimate of your salary?
No more than 50 000 per month
50000 – 100 000 per month
100 000 – 150 000 per month
More than 150 000 per month

35. Considering your relevance and qualifications after graduation, are there any promotion opportunities for you in the company where you worked/practised?
Yes
No

36. How satisfied were/are you with the work conditions in the company?

	Extremely dissatisfied	Moderately dissatisfied	Slightly dissatisfied	Neither satisfied nor dissatisfied	Slightly satisfied	Moderately satisfied	Extremely satisfied
	1	2	3	4	5	6	7
Rate from 1-7							

37. Rate your relationship with colleagues of the company you practice/practised

	Terrible	Poor	Very poor	Fair	Good	Very good	Excellent
	1	2	3	4	5	6	7
Rate from 1-7							

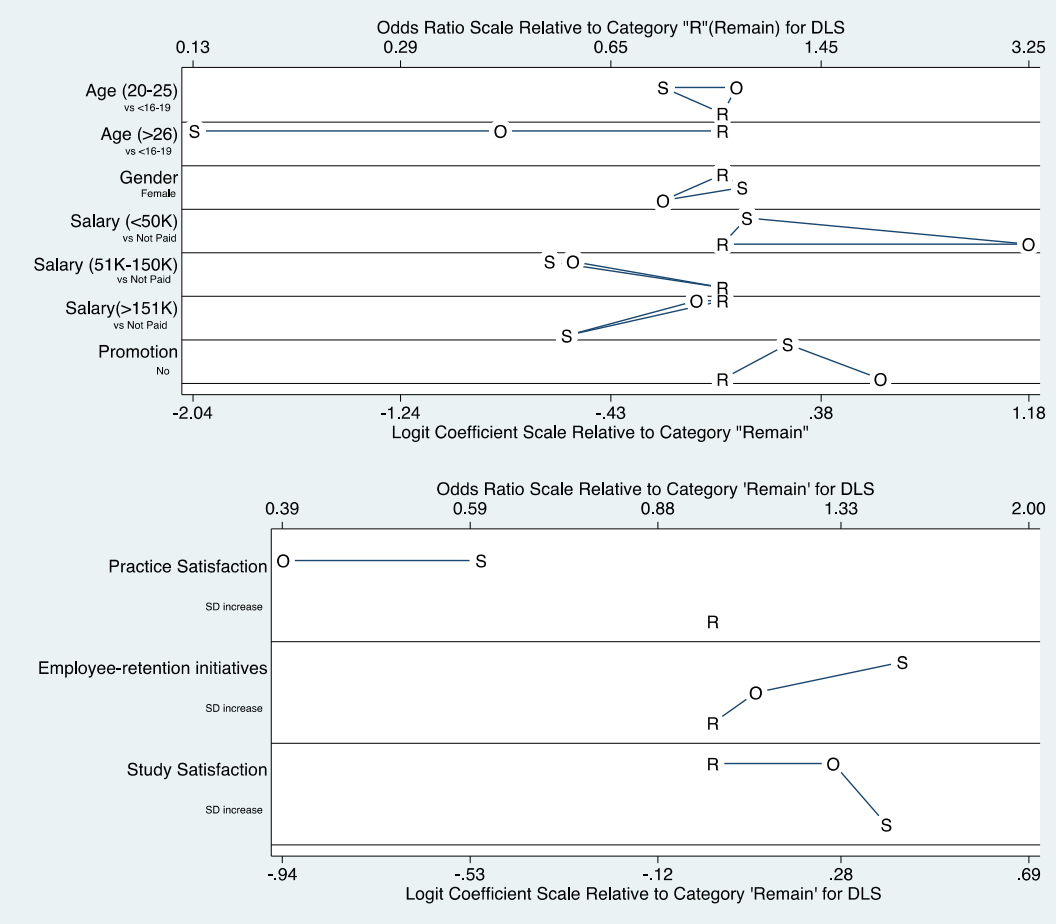
38. Your motivation level to work with the company more states one of the following:

	Extremely unmotivated. I will not work in this industry. I will try myself somewhere else.	Moderately motivated. I will remain, but not for a long time	Slightly unmotivated. I need to remain to earn money	Neither motivated nor unmotivated.	Slightly motivated. The work is convenient for some reasons.	Moderately motivated. I see some good opportunities.	Extremely motivated. Opportunities for promotion and having a good salary
	1	2	3	4	5	6	7
Rate from 1-7							

End of Block: Questions for Students of Dual program and Traditional form of Education
End of the survey

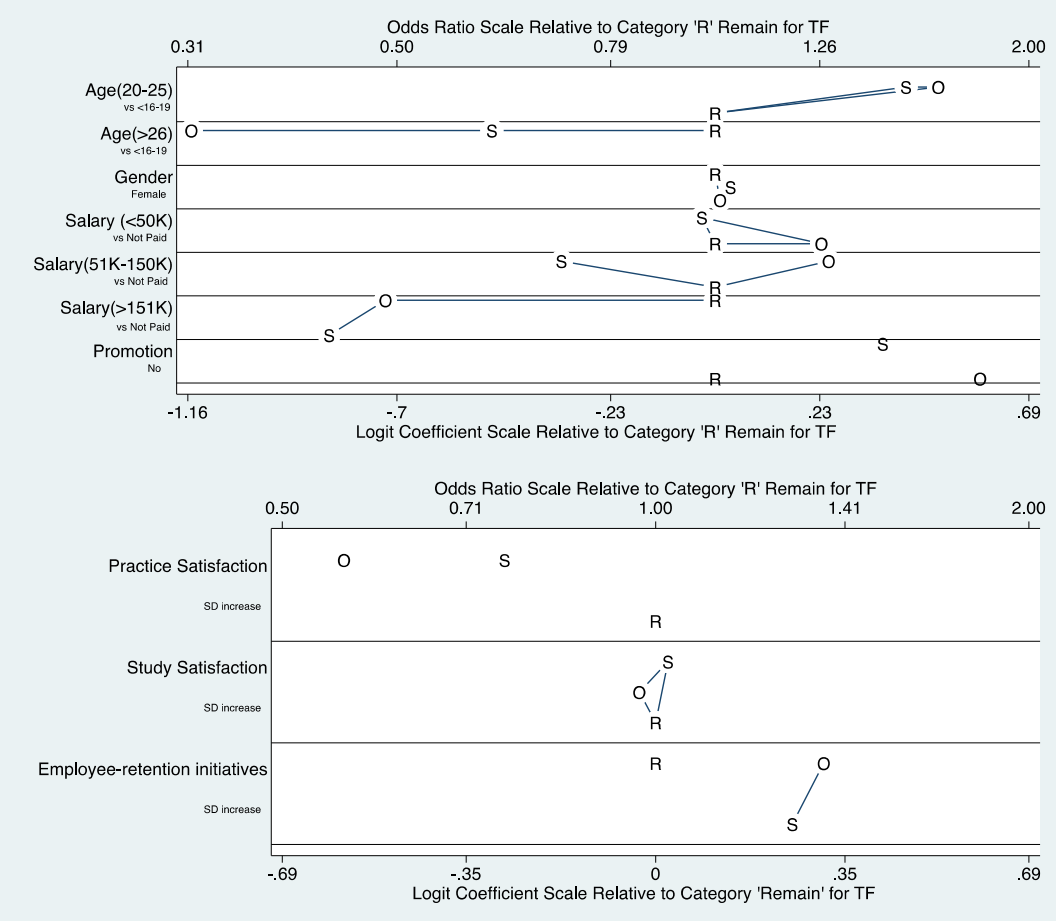
Appendix D

Odds ratio scales relative to the “Remain” category (DLS)



Note: O – Other, Sa – Same, R – Remain.

Odds ratio scales relative to the "Remain" category (TF)

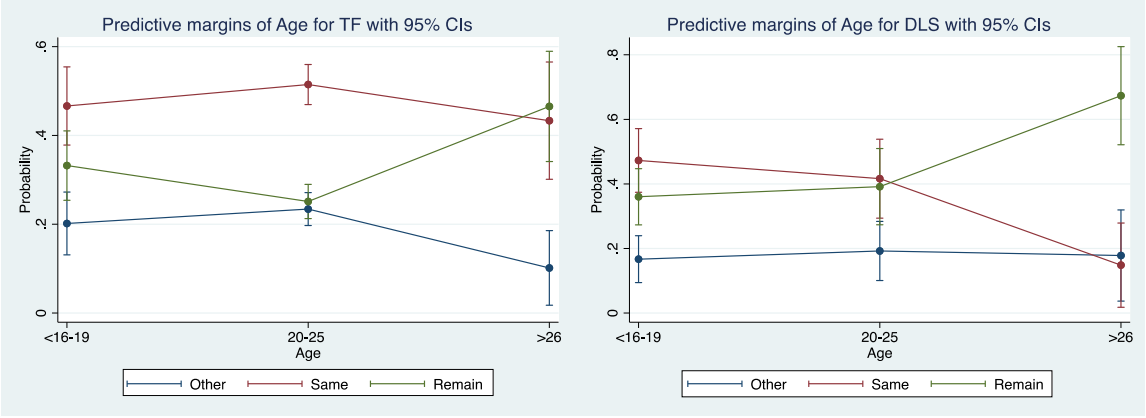


Note: O – Other, Sa – Same, R – Remain.

Appendix E

Predicted probabilities for Age (DLS, TF)

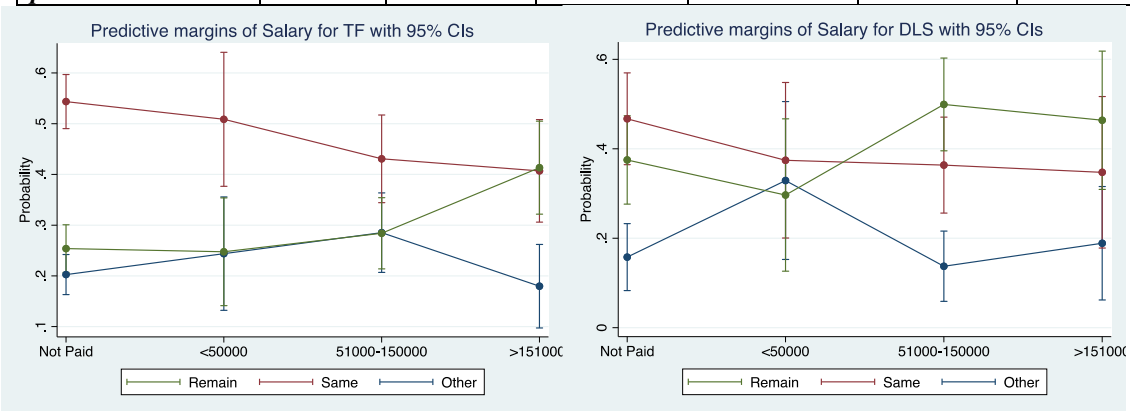
Age groups	TF, n=651, %			DLS, n=217, %		
	Remain	**Same**	**Other**	**Remain**	**Same**	**Other**
<16-19	33.2	46.6	20.2	36	47.3	16.7
p-value	0.000	0.000	0.000	0.000	0.000	0.000
20-25	25.1	51.5	23.4	39.2	41.6	19.2
p-value	0.000	0.000	0.000	0.000	0.000	0.000
>26	46.5	43.3	10.2	67.4	14.8	17.8
p-value	0.000	0.000	0.018	0.000	0.026	0.013



Appendix F

Predicted probabilities for Salary (DLS, TF)

Salary, KZT	TF, n=651, %			DLS, n=217, %		
	Remain	**Same**	**Other**	**Remain**	**Same**	**Other**
Not Paid	25.4	54.4	20.2	37.5	46.7	15.8
p-value	0.000	0.000	0.000	0.000	0.000	0.000
Less than 50K	24.7	50.9	24.4	29.6	37.4	33
p-value	0.000	0.000	0.000	0.001	0.000	0.000
51K-150K	28.4	43.1	28.5	50	36.4	13.6
p-value	0.000	0.000	0.000	0.000	0.000	0.001
151 K and more	41.3	40.7	18	46.4	34.7	18.9
p-value	0.000	0.000	0.000	0.000	0.000	0.004



Appendix G

Predicted probabilities for Promotion (DLS, TF)

Promotion (y/n)	TF, n=651, %			DLS, n=217, %		
	Remain	**Same**	**Other**	**Remain**	**Same**	**Other**
Yes	34	48.5	17.5	49.6	34.6	15.8
p-value	0.000	0.000	0.000	0.000	0.000	0.000
No	17.7	53.2	29.1	34.5	41.2	24.3
p-value	0.000	0.000	0.000	0.000	0.000	0.000