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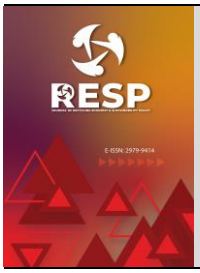

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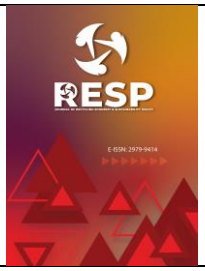

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Araştırma Makalesi ● Research Article

Crisis Management of Dual Training in Sustainable Synergy at a Higher Education Institution

Bir Yükseköğretim Kurumunda Sürdürülebilir Sinerjide İkili Eğitime İlişkin Kriz Yönetimi

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A N A H T A R K E L İ M E L E R

İkili eğitim
Yüksek Öğretim Kurumu
Kriz yönetimi
Sürdürülebilirlik
Dört boyutlu model

ÖZ

Alman modelini temel alan uygulamaya yönelik ikili eğitim artık Macaristan dahil Avrupa Birliği genelinde yaygındır. Yükseköğretim kurumları, özellikle uygulamalı bilimler üniversiteleri, endüstriyel ortaklarıyla birlikte, işgücü piyasasının ihtiyaçlarını karşılayan ve bunlara sürdürülebilir bir şekilde uyum sağlama konusunda esnek olan eğitim kurslarını önermektedir. Çalışma, bir pandeminin kriz olarak etkisini ve yönetim olanaklarını belirlemek için Dunaújváros Üniversitesi'nde yapılan bir anket araştırmasının sonuçlarını sunmanın yanı sıra, sürdürülebilirlik araştırmalarında uygulanabilir yeni bir tetrahedron değişim yönetimi modelini ortaya koymaktadır. Yükseköğretim kurumlarındaki krizler sırasında. Rus-Ukrayna savaşının neden olduğu enerji krizi sonucunda, Dunaújváros Üniversitesi'nin sürdürülebilirlik adına kış aylarında tekrar çevrimiçi eğitime geçmesi, çalışmaya ayrı bir güncellik kazandırmaktadır.

K E Y W O R D S

Dual training
Higher education institution
Crisis management
Sustainability
Tetrahedron model

A B S T R A C T

Based on the German model, practice-oriented dual training is now widespread throughout the European Union, including Hungary. Higher education institutions, universities of applied sciences in particular, together with their industrial partners, offer training courses that meet the needs of the labour market and are flexible to adapt to them, in a sustainable way. The study presents the results of a questionnaire survey at the University of Dunaújváros to determine the impact of a pandemic, as a crisis, and the possibilities of its management, as well as introduces a new tetrahedron model of change management applicable at the research of sustainability during crises at higher education institutions. The fact that the energy crisis caused by the Russo-Ukrainian war forced the University of Dunaújváros to switch to online education again in the winter months for the sake of sustainability gives the study particular topicality.

1. Overview of the global situation of dual training in Hungary

In both developed and developing countries, rising youth unemployment is a growing and serious challenge, with the level of demand for recent graduates higher than that of labour market actors, creating a potential gap in expectations. To mitigate this, effective dual training programmes based on a combination of classroom-based theoretical education and practical skills development are being used. As a result, the skilled labour market is developing and the demand for workers is better met. In many countries, dual training models have spread as a way to combat youth unemployment (Zimmermann et al. 2013). In Germany, Austria and Switzerland, such approaches have worked effectively and have evolved over time, raising the question of whether dual training models can work in other countries with similar positive results. In various countries, dual training opportunities have been developed through project work, but it has proved almost impossible to find examples of successful long-term adoption and application of dual training models (Gonon 2014; Valiente - Scandurra 2017).

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However, there are no detailed academic findings on these projects. Stockmann and Silvestrini (2012), as part of a meta-evaluation of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), examine the outcomes and usefulness of international vocational training projects, which after analysis concluded that most projects were small-budget pilots and not sustainable. They were mostly based on bilateral or multilateral cooperation agreements and focused on public cooperation to address challenges, mainly as a way to reduce youth unemployment.

The German model of dual training, in which young people are prepared for their careers by combining practical training in companies with vocational school education, is becoming increasingly popular. Under an agreement reached with Germany three years ago and with the involvement of the European Commission, Spain, Greece, Portugal, Italy, Portugal, Slovakia and Latvia have all agreed to adopt the structures of the dual education system in order to have a well-functioning dual education system to strengthen the labour market. Russia is using the same system to train mechatronics technicians, warehouse logisticians, bakers and cooks; in India, the first group of young people are learning the basics of metalworking; and in Brazil, toolmakers are also undergoing dual training.

There is also cooperation with China and Thailand. In Malaysia, there is already a vocational qualification based on the German craftsman's qualification. However, implementation faces a number of problems in Slovakia, where a new vocational training law had to be enacted before the system could be launched (European Commission, 2021). Overall, this start-up initiative by the European Commission recognises the diverging interests and focuses primarily on the transfer of the dual training model per se, rather than on an analysis of the advantages and disadvantages. The focus on the dual system in the context of the transfer debate reflects the intense debate that has developed in recent years around this model of vocational training (Valiente - Scandurra 2017).

2. The role of dual training in the system of studies

In Hungary, people can take part in dual higher education at bachelor's and master's level in engineering, information technology, agriculture, natural sciences, economics or health sciences, as well as in social work. In a dual training system, theoretical training is provided in a higher education institution, while practical training is provided in parallel by a partner organisation. In addition to their higher education studies, students on a dual training course undertake to carry out a placement with a qualified partner organisation during their training period. As a result, 22 weeks of work experience per year can be gained during the period of university education by working for the partner company (Education Office, 2021).

The partner organisation must have an agreed dual training programme with the higher education institution (Agreed Dual Training Programme (EDKP)) to deliver the apprenticeship. On the basis of the EDKP, the partner organisation trains students according to its own needs, supports them and adds practical skills to the knowledge acquired in the training institution (Ministry of Human Resources, 2021). In a first approximation, the training is given to prospective employees who, after graduation, can become full-time potential employees with relevant professional experience and knowledge in the partner companies' organisations.

Students participating in the dual training will gain insight into the functioning of the chosen partner organisation, get to know the company culture and learn the basics of the professions from professionals. At the end of the process, they will have competitive knowledge and experience that will give them a head start in their careers. In addition to the experience gained, the partner organisations also pay students a salary, in addition to fringe benefits (e.g. cafeteria, travel allowance, housing allowance), so that they can become financially independent during their higher education studies (Dual Diploma, 2021).

3. The legal background of dual training in Hungary and at the University of Dunaújváros

The concept of dual training is defined in the Section 108 1.b. point of Act CCIV of 2011 on National Higher Education (hereinafter referred to as: Nft.). According to this, "dual training" means a special form of training in a demanding undergraduate course in the field of technical, informatics, agricultural, natural or economic sciences, or a master's degree in that field, in which the full-time, containing specific provisions for the training period, training methods, lesson, assessment of the acquired knowledge, according to the curriculum within the framework defined by the Dual Training Council, and the practical training takes place, at a qualified educational institution." Also the Nft. fixes the rules of student work, the remuneration of students (Section 44 of the Nft.); and the concept of a practice-intensive course [Section 85 (3)]. This practice-oriented, bachelor-level training, which was developed in Germany (Szabó 1997) aims to enter the world of work immediately, without several years of further training and without additional financial expenditure. In Hungary, this form of training quickly became popular due to the growing demand of the labor market, also due to the fact that it has a detailed and appropriate legal background. The domestic and international literature on the topic is also rich and constantly expanding (Berács 2017; Graf et. al. 2014). As a result of the COVID-19 pandemic, however, new circumstances have arisen in the course of training, which also offer the opportunity to outline new directions

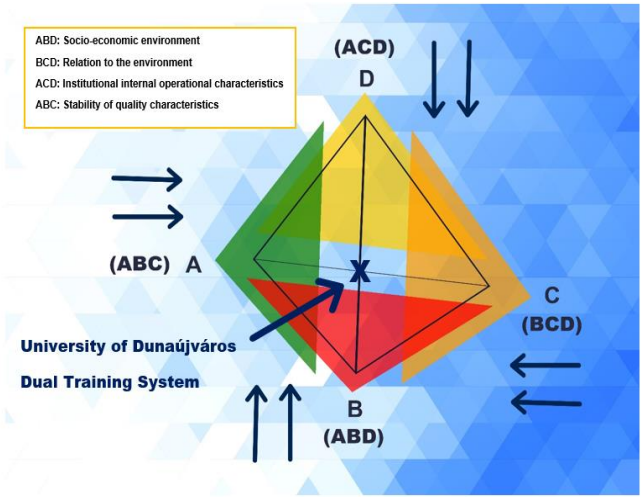
for training.

At university level the University of Dunaújváros maintains and operates the Dual Training Center, whose task is to promote training in the lives of students and companies within the university. Creates posters, leaflets and also organizes events for advertising purposes (Section 4 of the Rules of Procedure of the Dual Training Center).

4. The tetrahedron model of change management at the University of Dunaújváros

The competitive position of higher education institutions has gradually strengthened over the past twenty years and the 2020s will bring major changes in many areas. The structural, qualitative changes that define the day-to-day operations of the institutions, the necessary online education and digitalisation have required institutions to use strategic and change management tools effectively. Higher education institutions have to respond to a myriad of demands, both domestic and international, the most prominent of which has been the viral situation in the 2020s and the emergence of online education. These demands are also linked to different societal roles and responsibilities, such as the needs of students, whether at home or abroad, in normal or dual courses.

Figure 1. Quality-centred analysis of the tetrahedron model of change in the place of dual training in these subsystems



Source: edited by the authors

Figure 1 illustrates the subsystems of the quality approach for the University of Applied Sciences in the light of the quality management dimension of change management from four closely related perspectives. Along the edges of the tetrahedral model of change, the interrelationship between the elements of the pages can be traced. The tetrahedron is based on the constancy of quality attributes. The socio-economic environment, the relationship with the environment, the elements of the structure of the internal operational characteristics of the institution can be understood.

Measures to support teachers and researchers in the assessment and validation of learning methods and key competences. As regards the recognition of learning outcomes and qualifications, the University of Applied Sciences will give priority to segments such as the emphasis on development linked to quality development, the enhancement of the role of individual research, or creativity and the strengthening of teamwork approaches. In the dimension of the stability of quality attributes (ABC), it is important to look at the development of key competences to help students make a smooth transition to the world of work. DUE's training programmes encourage students and employees, support results-oriented operations and alternative ways of transferring knowledge. The support for the development of education and training infrastructure in the socio-economic characteristics dimension (ABD) will be implemented in the following elements: taking into account different needs, changing roles of infrastructure development, competitiveness, partnership, supporting the role of online education. Feedback on environmental, economic and social challenges, integration of sustainability in teaching materials, launching of pilot projects will be integrated in the environmental dimension (BCD). Support for the acquisition of digital skills and the digital education and training process. The organisational vision of dual training is based on a common intersection. Training is located in the middle of the tetrahedron. The University of Dunaújváros, in addition to matching the existing training in its training portfolio to market needs, will in the coming period devote a significant role to the development of the dual training area. Thanks to an efficiently functioning online "infrastructure", it intends to compete for students with a marketable training offer that is also viable on the international scene.

5. Structural changes in universities changing models

From time to time, it has been argued that it is not more efficient for either the state or the universities to operate in a way that brings higher education institutions under the public purse. Under this system, the amount of funding universities receive depends on the annual central budget and the number of students admitted. The pay and promotion of teachers is determined by the civil service pay scale. Universities, partly out of necessity, have so far operated under a system that is not university-based but follows the bureaucratic mechanism of the state.

Figure 2. Main areas of model change

Source: edited by the authors

Figure 2 illustrates which areas of the current state-supported system are very inflexible and which segments would benefit from restructuring. A key element of the model, as highlighted by the government, is the possibility of more effective cooperation between universities and the private sector. At both the personal and institutional level, researchers and academics can better match their academic activities with their careers in the private sector, and the university or its individual institutes or faculties can work more flexibly with the private sector. The change of model is expected to increase the economic/financial autonomy of universities. A worrying issue on the societal side is that many of the courses offered by science universities cannot be flexibly linked to the private sector. Despite the disadvantages of the civil servant status, such as inflexibility and disregard for individual performance, it offers greater security and protection than the employment relationship under the Labour Code (Act I of 2012 on the Labour Code). The change of model therefore deprives the institutions of certainty. A criticism is the inclusion of a business perspective, i.e. the approach of thinking of education primarily as a servant of the market. If this approach is used to assess the professional performance indicators of faculties, courses and disciplines, it will have negative consequences for the institution. There are many areas, from the humanities to the arts and the less applied aspects of the natural sciences, which may be damaged by this approach, but which are more valuable than those which are seen by decision-makers as providing 'marketable' knowledge. Contrary to current experience, higher education institutions expected the Boards of Trustees to have an essentially symbolic, representative role, representing the interests of universities vis-à-vis the political and business community. However, the legislator has given the boards of trustees a much more important role, changing the decision-making mechanism.

6. Presentation of related research

The University of Dunaújváros currently has 101 students in dual training, and with their help, a study on the effectiveness of training with an industrial background will be carried out in spring 2020, and then in spring 2021 to monitor the professional development of students. Using an online questionnaire method, primary information was collected directly from students. The target population was reached by means of questionnaires sent to e-mail addresses entered in the Neptun study system. According to the questionnaire data, the dual training courses support the professional development of students in Computer Science, Computer Engineering, Mechanical Engineering, Mechanical Engineering, Chemical Engineering, Management and Technical Management and Materials Engineering. In 2020, 14 partner training companies were interviewed for training places representing all types of training places. For students, the survey resulted in a random sample of 70% with 70 participants, while the inclusion of training experts included 6 participants in the research sample. In 2021, 14 partner training sites were surveyed. For students, the survey this year resulted in a 64% random sample of 67 people, with 5 people included in the survey of teaching experts.

Students were asked about the following topics during the survey:

(a) In your opinion, are students in dual training more of a burden than their counterparts in general training?

b) In your opinion, what are the advantages of choosing this form of training?

(c) In your opinion, how does the current epidemiological situation affect the choice of dual training?

(d) Do you think that the current situation could cause problems for these students in meeting the practical requirements?

e) What do you think could be changed in this area of training to make it more attractive to students?

(f) In your opinion, how could the current situation be improved to help students in dual training to meet the practical requirements of the semester as easily as possible?

g) In your opinion, has the pandemic changed the relationship between dual trainers and students and, if so, how?

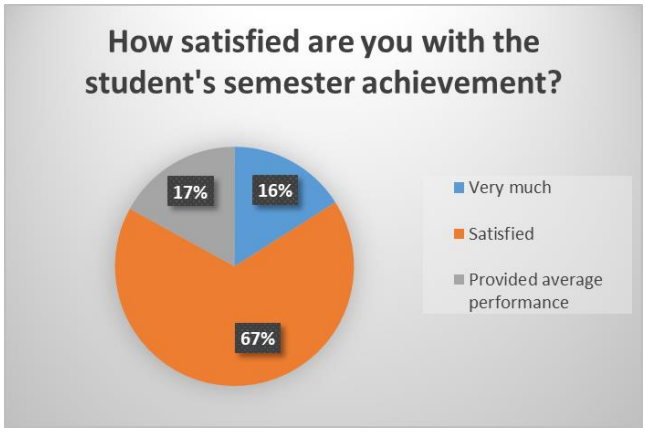
h) Do you think that the changes caused by the pandemic will change the strategic objectives of the training in the future?

i) Do you think that the changes caused by the pandemic will affect the professional content of the dual training?

7. Research results

42% of respondents were able to carry out tasks and tasks requiring independent work without difficulty before the epidemic, rising from 40% in 2020 to 44% in 2021. For practical type subjects, the institution encouraged independent task solving, students were given more individual tasks, the ability to learn independently was valued and had a positive impact on individual work performance. Due to the total restriction, students in dual training fulfilled their training obligations in digital form, it was decided on a company-specific basis which partner organisation required personal consultations and practical work. This was done according to the epidemiological protocol specific to the company. Among the students of the University of Dunaújváros participating in the dual training, there were no deferrals or backlogs of studies during the Covid situation.

Chart 1. How satisfied are you with the student's semester achievement? (2020)



Source: edited by the authors

Chart 2. How satisfied are you with the student's semester achievement? (2021)

Source: edited by the authors

Chart 3. The time of integration of the dual student in the given organization (2020)

Source: edited by the authors

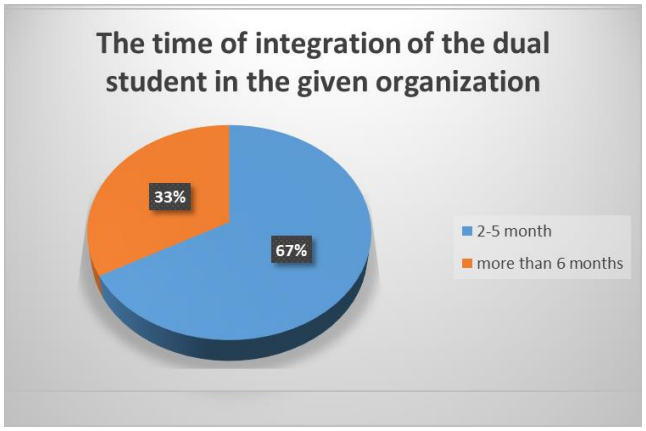


Chart 4. Practical application of the theoretical knowledge of the dual student (2020)

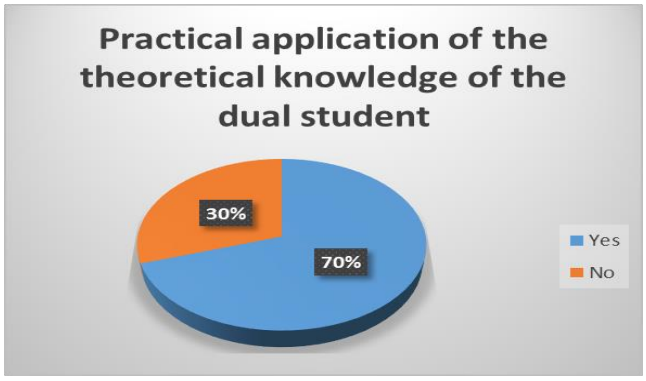


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Chart 5. The time of integration of the dual student in the given organization (2021)

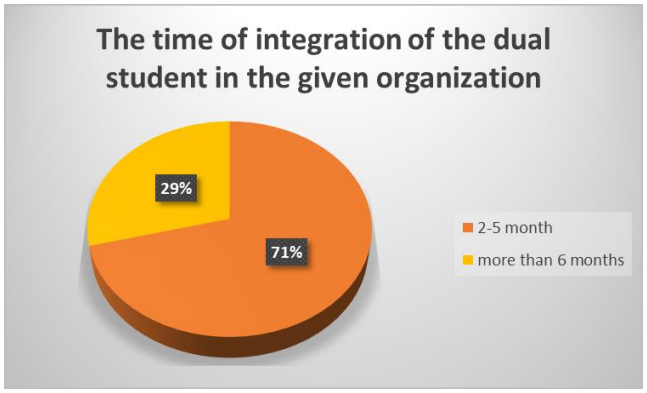

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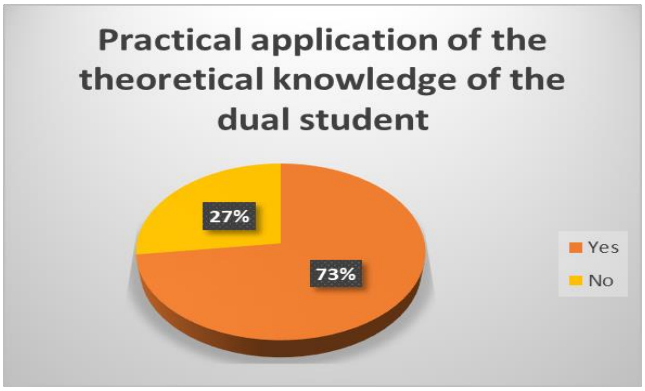
Chart 6. Practical application of the theoretical knowledge of the dual student (2021)



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In distance learning, a number of solutions can be successfully applied, using different software, simulations, giving students creative tasks, full digital access to learning materials through the Moodle eLearning framework, creating a workshop environment in the digital space. Students were provided with explicitly practice-oriented and problem-solving training, which facilitated their professional development thanks to well-designed and structured curriculum development. In general, students' self-advocacy and communication skills have changed positively, the relationship between training places and trainers has been strengthened, and flexibility between partners and students has increased.

The main expectations of dual training as perceived by society:

- *flexibility, quality, short duration*

- *mapping global objectives to the local level:*

- *it seeks to meet local needs at local level*

- *reduces labour migration*

- *Combines academic knowledge and practical skills*

- *fulfils the industry's primary objective of providing a competitive supply of highly skilled workers*

Practical experience has shown that the relationship between companies and higher education is more intensive than in the case of traditional forms of training, but at the same time openness and inclusiveness on both sides is necessary to achieve the objectives set and to ensure successful operation. By getting to know the network of contacts and resources of the organisation/employer, the network of cooperating institutions, and by becoming part of the network, the student will have the opportunity to gain recognition and acceptance. The workload of students in dual training is at least twice the average workload of a traditional type of training. From the perspective of the higher education institution, offering a dual training programme can increase the number of students. A student entering a dual programme can be prepared in the classroom and can present a higher professional standard through questions and comments, which can act as a pull factor for students. In general, dual cooperation broadens cooperation with the subject area and can also have a beneficial effect on its content. The following arguments are put forward by the theoretical training centre. The dual training programme is a training programme that requires a considerable amount of energy in addition to the familiarity and partnerships that are established. Effective implementation requires considerable coordination and continuous communication even after a student has joined the programme: support for the student, support for the institution, and not always a dedicated, free teaching capacity. According to the reports of the professionals who teach in engineering courses, the shortcomings and negative aspects of theoretical training are not always fully are revealed in a different quality. It can lead to tensions among theoreticians, and may not necessarily lead contributors towards a solution in the absence of additional resources.

University

- Delivering high quality vocational and market-oriented training

- Increasing professional visibility and recognition

- Increase student numbers and enrolment

- Increase the range of educational and research partnerships

Students

- Selected by employers

- Long-term stable career opportunities

- Acquisition of skills that can be used in daily practice

- Self-paced but supervised learning

Companies

- Supply of skilled workers

- You get what/who you need

- Control the learning process

- Reduce the risk of employee churn

Chamber

- Alleviate skills shortages

- Implementing dual training for mechanical engineers in line with workers' needs

- Establishment of long-term training and continuing training cooperation

Typical aspects of the perception of dual training:

Some of the industrial partners in employment made the following statements: "... there is a huge gap between university education and practice, education has become too theoretical and workshop-oriented, which is also disadvantageous for domestic SMEs. The introduction of dual training is a partial solution to the problems identified in the new higher education strategy, but he believes that the German model without examining the social and economic relations and adapting them to the Hungarian specificities is not a good idea." Strengthening practice orientation is the most important aspect, based on the expectations of industrial partners and the labour market. In its current form, dual training does not give the SME sector the role that is in fact the main objective of the reform. In some of the models to be introduced, they will train a cheap, easily adaptable workforce for multinational companies, and thus the skills of graduates will be used mainly in operations. The decision-maker considers that:"... the students' knowledge is far from being limited, on the contrary, they will gain much greater insight and a broader knowledge of real business operations than in traditional training...". The curricula also focus mainly on the specialised areas of activity of large companies, where the knowledge is most useful. Industry - in order to develop, it needs professionals with a broad range of knowledge who can provide new information and skills.

Cornerstones for development:

- Study "good practices".

- Interviews with an external partner in the framework of the implementation

- Operation of an institution-specific concept

- Specification of a customer relationship management

Features of the training structure:

system (CRM) (marketing, communication)

- EFQM system business plan for the contractual process of corporate partnerships

- Assessment of the soft skill expectations of students on the labour market

- Training and development of students and trainers,

- Assessment of the labour market relevance of university courses

Internal environmental elements for effective implementation

- Organisational structure adapted to market conditions, transformation of linear functional organisation.

- Monitoring changes in the labour market and incorporating them into the management strategy

- Defining competences and responsibilities adapted to the changed tasks, and drawing up personalised job descriptions.

- Organisational development:

- Defining the objectives to be achieved

- Simple and standardised contracts

- Open calls for tender

- Identification of preferred research areas

- Internal selection

- Restructuring of highly fragmented organisational structures Preference for matrix-type operation

- Description of "good practice

Dual training complex knowledge material

University	Joint Intersection	Partner	Dual Training Centre
Theoretical knowledge (known body of subject knowledge)	Company selection criteria Admission point value and point threshold	Practical knowledge (known body of subject knowledge)	Definition of Organisation and Operation Definition of tasks Laying down the principles of service provision
Research, computational procedures, modelling (methodological skills)	Qualification thesis and diploma results	Project-based work, problem research, analysis, synthesis (methodological skills)	Defining the organisation's network Organisation of tasks and responsibilities Definition of tasks relating to research, innovation development and quality assura
Self-awareness, leadership (social skills)	Workplace performance appraisal criteria and results	Motivation, delegation, evaluation, communication skills, cooperation (social	Definition of tasks of an administrative/organisational nature Specification of necessary staffing

skills) conditions
Setting the form and level of funding

8. Conclusion. Dual training - the importance of synergy in higher education institutions

The emergence of the coronavirus has led to the introduction of a number of restrictions worldwide, which have made it more difficult to conduct mainstream education and professional training, such as total closures and physical distance learning, with the consequent emergence of distance learning and its forced innovation and development. However, access to learning and skills development in some contexts has been maintained by the rapid shift to distance learning in technical, vocational and technical education and training, with pre-existing social and digital divides putting the most marginalised groups at risk of being left behind. With few exceptions, the increased use of online learning solutions in programmes has not facilitated the acquisition of practical skills and the organisation of work-based learning, which are essential ingredients for the success of dual training.

The situation is further colored by the energy crisis caused by the Russian-Ukrainian war, which forced several institutions, including the University of Dunaújváros, to switch to online education again in the winter months for the sake of sustainability. Unfortunately, the crisis did not spare the dusl partner companies either.

The closure of partner firms and their declining profits have had an impact on employment, job prospects and reduced the expansion of apprenticeships in enterprises. The limited availability of viable distance learning platforms and educational resources, the specialisation of assessment and the drive to maintain the quality of training have made life difficult for students and trainers alike, and increased the likelihood of falling behind or even dropping out of education, combined with growing economic hardship.

In contrast, an online survey conducted by the International Labour Office, the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the World Bank between 5 April and 15 May 2020 on the impact of the Covid-19 pandemic on dual training and skills development reported a number of positive practices that appear promising. These include the development of flexible learning and assessment opportunities. Public and private actors in dual training have immediately formed partnerships to increase the availability of accessible distance learning solutions, develop new training programmes and allocate additional resources to alleviate skills and labour shortages in sectors severely affected by the health crisis. These joint efforts have resulted in innovative solutions in response to the pandemic. Higher education institutions will help to further develop opportunities to ensure better preparedness and rapid recovery.

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RESP

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Sosyal Hizmet Bağlamında Ekopsikolojinin Değerlendirilmesi

Evaluation of Ecopsychology in the Context of Social Work

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ANAHTAR KELİMELER

Doğa
İnsan
Sosyal hizmet
Ekoterapi

ÖZ

Bireylerin sosyal refaha erişiminde bir köprü görevi üstlenen sosyal hizmet mesleği; kadınlar, yaşlı bireyler, yoksul bireyler, engelli bireyler, göçmenler, kimsesiz çocuklar gibi dezavantajlı olarak nitelendirdiğimiz birey, grup ve toplum ile çalışmaktadır. Sosyal hizmet mesleği bugünü ve yarını ile insanı anlamak üzerine inşa edilmiş olup toplumda ayrım gözetmeksizin her bireyin eşit haklara sahip olması gerekliliğini savunmuştur. Bu bağlamda sosyal hizmet uzmanları danışanların iyilik halini gözeterek her bireyin ve olgunun biricik olduğu anlayışından hareketle özgün müdahale sistemlerini uygulamaktadır. Bu noktada ise güncel bir kavram olan eko-terapi ve ekopsikoloji karşımıza çıkmaktadır. Ekopsikoloji; insanların doğa ile engellenemez bir bağının olduğunu, doğanın insanlığa sunduğu güzellikler sonucu bireylerin iyilik halinin arttığını ve insan ile doğa arasındaki işlevselliğin artışının aralarındaki etkili iletişime bağlı olduğunu savunan bir yaklaşımdır. Ekopsikolojiyi ve amaçlarını anlamak, insan psikolojisi ile ilgilenen sosyal hizmetin yeni yaklaşımlar geliştirmesi açısından önem arz etmektedir. Bu nedenle ekopsikoloji yaklaşımı sosyal hizmet bağlamında artık daha çok değerlendirilen bir kavram olarak ortaya çıkmaktadır. Böylelikle ekopsikoloji uygulamalarının sosyal hizmet mesleği içerisinde daha görünür olması ve uygulama alanlarının her geçen gün artması kaçınılmazdır.

KEYWORDS

Nature
People
Social work
Ecotherapy

ABSTRACT

The social work profession acts as a bridge for individuals to access social welfare; It works with individuals, groups and societies that we describe as disadvantaged, such as women, elderly individuals, poor individuals, disabled individuals, immigrants and orphaned children. The social work profession is built on understanding people, today and tomorrow, and advocates that every individual should have equal rights without discrimination in society. In this context, social workers apply original intervention systems, considering the well-being of clients and based on the understanding that each individual and case is unique. At this point, eco-therapy and ecopsychology, which are current concepts, appear. Ecopsychology; It is an approach that argues that people have an unstoppable bond with nature, that the well-being of individuals increases as a result of the beauties that nature offers to humanity, and that the increase in functionality between humans and nature depends on the effective communication between them. Understanding ecopsychology and its purposes is important for social work dealing with human psychology to develop new approaches. For this reason, the ecopsychology approach is now emerging as a concept that is more evaluated in the context of social work. Thus, it is inevitable that ecopsychology practices will be more visible within the social work profession and its application areas will increase day by day.

1. Giriş

İnsan, varoluşu gereği ana rahmine (cenin) düştüğü andan itibaren çevresel faktörlerden etkilenen bir varlıktır. Anne karnında iken çevreden gelen olumsuzluklar; annenin sinirli veya gergin bir ruh halinde olması, olumsuz doğa koşulları ve bu olumsuzlukların anne üzerinde bıraktığı endişe, sigara alkol gibi alışkanların devam etmesi ve benzeri olgular kişinin karakterini, dilini, fiziksel ve ruhsal gelişimini etkilemektedir (Akın, 2014). Henüz dünyaya gelmemişken çevresinden bu denli etkilendiği görülen insanın, doğumundan ölümüne kadar olan süreçte de yaşadığı çevreden fiziksel, bilişsel ve psikolojik olarak etkilenmesi kaçınılmazdır. Çevrenin insana etkileri sadece kişilik oluşumu ile sınırlı tutulmamaktadır. Bireyler yaşamlarında

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karşılaştığı stres, anksiyete, bağımlılıkla mücadele, umutsuzluk, depresyon gibi olumsuzluklarla baş ederken farkında olarak veya olmayarak doğanın iyileştirici gücünden yararlanmaktadır. İnsanın yaşadığı çevrenin iyilik hali ile kişinin ruhsal\duygusal iyilik seviyesi birbiri ile paraleldir. İyi bir sosyal çevrede yaşayan kişi daha mutlu, pozitif, üretken olabileceği gibi olumsuz koşullara sahip çevrede yaşayan kişi de daha negatif, sinirli, pasif özelliklere sahip olabilmektedir (Samuk, 1992).

Söz konusu çevresel etmenlerin temel yapısını oluşturan ekoloji; 1866 yılında Alman biyolog Ernest Haeckel tarafından kullanılmış olup canlıların yaşadığı çevre ile ilişkisini incelemektedir. (Bozdoğan, 2003). Ekoloji terimi, Yunanca ‘’oikos’’ kelimesinden türetilmiş olup, etimolojik olarak ‘’yaşanılan yer, yurt’’ anlamına gelmektedir (Maltaş, 2015). Ekoloji, çevresel sorunların insanların doğaya verdiği tahribat sonucu ortaya çıktığını savunmakta ve insanın kendisine gösterdiği saygıyı doğaya da göstermesi gerektiğini vurgulamaktadır (Çüçen, 2011). Ekoloji, 1970’ li yıllara kadar doğal yaşam sisteminde flora ve faunanın çevresiyle ilişkisini incelerken günümüzde doğada meydana gelen değişimlerin kişiye etkileri ve insan-doğa ilişkisini konu edinen disiplinlerarası bir bilim dalı durumuna gelmiştir (Bozdoğan,2003). Bu bağlamda ekoloji ile psikolojinin kesişimini ifade eden ‘’ekopsikoloji’’ kavramı karşımıza çıkmaktadır. Ekopsikoloji, insan ile doğa arasındaki ilişkiyi yeniden canlandırmayı amaçlayan ve bu ilişkinin insan sağlığına olumlu etkilerde bulunacağını savunan, ekolojinin farklı disiplinlerle birleşimini oluşturan bir yaklaşımdır. Ekopsikoloji ruhsal bilişsel anlamda insan sağlığını önemsemektedir. İnsanın yüksek yararı için farklı tedavi yöntemleri geliştiren psikoloji, insan ve toplum arasındaki ilişkiyi inceleyen sosyoloji, tüm bunları kapsayarak bireylerin ait olduğu çevrede ekonomik, psikolojik, fiziki ve bilişsel yönden yüksek refah seviyesine ulaşmasını ilke edinen sosyal hizmet için ekopsikoloji yaklaşımı güncel ve önemli bir kavram olarak karşımıza çıkmaktadır. Sosyal hizmet mesleğinin bilimsel etik ve değerleri ışığında ekopsikolojinin değerlendirildiği bu çalışmada, yeni bir yaklaşım olan ekopsikoloji kavramına yer verilmesi alan yazınına katkı sağlaması bakımından önemlidir. Çalışmanın ikinci bölümünde ekopsikolojinin tanımına yer verilip üçüncü bölümde güncel bir yaklaşım olan ekopsikolojinin farklı uygulama alanları hakkında bilgi verilecektir. Dördüncü bölüm sosyal hizmet bağlamında ekopsikolojinin değerlendirilmesini içermektedir. Sonuç kısmında çalışmanın okuyucuya sunduğu bilgiler özetlenerek bir sonuca bağlanacak ve çalışma sonlanacaktır.

2. Doğanın İyileştirici Yönü: Ekopsikoloji

Ekoloji, pek çok bilim dalına ithaf eden ve farklı alt başlıklara sahip disiplinlerarası bir kavramdır (Çepel, 2006). Ekolojinin yaşamın her alanı ile ilgili olması bakımından psikoloji, sosyoloji, felsefe gibi alanlarda da gelişimi elzemdir. Literatüre bakıldığında ekoloji kavramı; ekopsikoloji, eko feminizm, ekososyoloji, derin ekoloji, ekosofi, paraekoloji gibi alt başlıkları içermektedir(Dindaroğlu, 2014). Sosyal hizmetin insan psikolojisi ile ilişkisi düşünüldüğünde ‘’ekopsikoloji’ kavramının tanımı çalışmanın bu aşamasında önem arz etmektedir.

Ekopsikoloji konusunda doğanın insan psikolojisine etkisi ve insanların duygu durumlarının doğaya etkisi hakkında yapılan çalışmalar son yıllarda ön plana çıkmakta ve günden güne literatürde yerini almaktadır. Bu noktada ekopsikoloji günümüzde çok fazla görülen depresyon, anksiyete, kaygı bozukluğu gibi problemlerin ve bu problemlerin sebep olduğu madde yönelimi suça sürüklenme gibi olumsuzlukların önüne geçmeyi amaçlamaktadır (Barut, 2020). Bu amaç doğrultusunda ekospikoloji insan ve doğayı bir araya getirmekte, bilişsel ve psikolojik sağlığın doğayla ilişkisini sürdürülebilir bir şekilde sağlanması gerektiğini ortaya koymaktadır. Barut (2020) ‘ a göre ekopsikoloji, doğa ile insan arasında geçmişten beri var olan küslüğü sona erdirmek ve kendine yabancılaşan bireyleri özüne döndürmek için çalışmaktadır. Ekopsikoloji,1982 yılında Paul Shepard’ ın doğa ve insan üzerine yürüttüğü çalışmasıyla ön plana çıkmıştır ve farklı alanlarda bilimsel çalışmalar yürüten akademisyenler tarafından 1990’ lı yıllardan sonra akademik çalışmalarla gündeme gelmiştir (Yürcü, 2016). Ekopiskoloji kavramından ilk olarak Theodor Roszak tarafından 1992 yılında kaleme alınan "The Voice of the Earth"(Dünyanın Sesi) adlı kitabında bahsedildiği bilinmektedir. Kitapta bahsi geçen ekopsikoloji kavramı, doğa ile insan psikolojisini birlikte değerlendirmekte; doğadan uzaklaşan insanların mutluluk düzeylerinde azalma olduğunu ileri sürmektedir(Metin vd., 2022). The Voice of The Earth kitabında Roszak, ekopsikolojinin amaç ve savunduğu düşünceleri sekiz temel ilke ile tanımlamaktadır:

- "Zihnin temelinde ekolojik bilinçdışı yatmaktadır; yani her insan doğuştan doğaya dair bir bilince sahip olmaktadır".
- "Ekolojik bilinçdışının içeriğinde, kozmik evrimin, tarihin ilk zamanlarına kadar uzanan kaydı bulunmaktadır".
- "Eko-psikoloji 'nin amacı, insanın ekolojik bilinçdışında bulunan ve doğuştan sahip olduğu, doğa ve insanın karşılıklı ilişkisine dair bilgiyi uyandırmaktır".
- "İnsan gelişiminin hayati aşaması çocukluk dönemi olmaktadır. Eko-psikoloji çocuğun henüz unutmadığı çevresel bilinci yetişkinlerde de uyandırmayı amaçlamaktadır. Çocukta bu bilincin gelişmesi içinse doğayla ilgili hikâyeler, masallar, ninniler çok önemli yer tutmaktadır".
- "Ekolojik bilincin gelişmesiyle insan, doğaya ve diğer insanlara karşı ahlaki bir sorumluluk duygusuna sahip olmaktadır. Eko-psikoloji bu sorumluluk duygusunun sosyal ilişkilerde ve politik kararlarda söz sahibi olmasını amaçlamaktadır".
- "Eko-psikolojinin en önemli terapilerinden birisi, doğayı bir yabancı gibi gören ve ona hükmetmeye çalışan, politik gücün de kaynağı olan "eril" karakter özelliklerini yeniden ele almak ve düzeltmek olmaktadır".

- "Eko-psikoloji sanayi kültürünün yıkıcılığını sorgularken, hayatımızı kolaylaştıran teknolojiye karşı gelmemektedir. Bu anlamda Eko-psikoloji antiendüstriyel değil, post-endüstriyel yapıya sahip olmaktadır".
- "Dünyanın ve kişinin iyiliği arasında "sinerjik" bir etkileşim olduğundan dünyanın ihtiyaçları insanın da ihtiyaçları, insanın hakları, dünyanın da haklarıdır " (Yürcü, 2016).

Ekopsikoloji insanlara doğayı korumaları için duyarlılık kazandırmakta, bireyler ile doğal çevre arasındaki uzaklaşmayı anlamlandırmaya çalışmakta bu bağlamda çözüm yöntemleri geliştirmektedir. Ekopsikolojinin etik değerlerini doğaya saygı göstermek ve zarar vermemek, doğal çevreye katkıda bulunmak oluşturmaktadır (Yürcü, 2016). Günümüz dünyasında artış gösteren teknoloji bağımlılığı insanları asosyal olmaya teşvik etmekte, doğa ile bağını zedelemektedir. Ekopsikoloji kişiler ile doğa arasında yapıcı bir köprü oluşturmayı hedeflemekte ve stres anksiyete kaygı gibi duygu durumu bozuklukları ile başa çıkma konusunda doğadan yardım almayı teşvik etmektedir.

3. Ekopsikolojinin Uygulama Alanları

Ekopsikoloji insan ve doğa arasındaki ilişkiyi iyileştirmeye ve bu sayede insanın bilişsel, duygusal anlamda güçlendirici bir destek görmesine yardımcı olmaktadır. Bilindiği üzere Covid-19, etkili olduğu yıllarda evrensel nitelikte olumsuz sonuçlara yol açmıştır. Covid virüsünün insan psikolojisi üzerine etkileri hakkında yapılan çalışmalar; karantina, yalnızlık, teknoloji bağımlılığı, kaybetme korkusu, kaygı, anksiyete gibi sorunların bu sürecin olumsuz etkileri olduğunu ortaya koymaktadır (Zeybek, vd., 2020). İnsan sağlığını fiziksel ve psikolojik yönden olumsuz etkileyen pandemi sürecinin kişileri doğal ortamlara, köylere, ormana yönlendirmiş olması da muhtemel sonuçtur. Çünkü yaşanılan çevrenin insan sağlığı üzerindeki etkileri kaçınılmaz bir gerçektir. Doğanın ve çevrenin insan sağlığı üzerindeki etkileri birçok çalışmada konu olmuştur. Bu bağlamda çevrenin kişiye etkilerini fiziksel, psikolojik ve zihinsel şeklinde gruplandırarak ele almak ekopsikolojiyi anlamak için önemli bir adım olacaktır.

Doğanın iyileştirici etkilerinden yola çıkarak oluşturulan ekopsikolojinin uygulama alanları bu bölümün konusunu oluşturmaktadır. Ekopsikoloji disiplinlerarası bir yaklaşım olarak kabul edildiğinden pek çok farklı yönde de uygulaması mevcuttur. Söz konusu uygulamalar: hortikültürel terapi, ekoterapi, yeşil egzersiz, macera terapisi, yeşil spor salonları ve doğa destekli terapi uygulamalarıdır (Filiz, vd., 2020).

Tablo 1: Çevrenin İnsan Üzerindeki Etkileri (Filiz, vd., 2020).

Fiziksel Etkiler	Psikolojik Etkiler	Zihinsel Etkiler
Bağışıklık sistemini çalıştırma ve vücudu iyileştirme.	Stresi azaltma ve genel iyilik halinin güçlenmesi.	Zihin yorgunluğunun azalması, dikkatin artması.
Hastalıkların daha kolay iyileşmesi.	İletişim becerilerinin artması, benlik saygısının yükselmesi.	Yaratıcılığın güçlenmesi ve merak duygusunun artması.
Koklama, dokunma, görme, tatma gibi duyuları uyarma.	Empatik olma, duygusal stabilite, yoğun sevgi hissi, özgecilik.	Dışa dönüklülüğün artması.
Temiz havada bulunarak canlılık hissinin artması	Yalnızlık ve sakinlik hissi.	Doğa tarihini öğrenme.

- Hortikültürel Terapi:

Ekolojinin ve yeşilin korunması esasına dayanan hortikültürel terapinin uygulama alanını bahçeler oluşturmaktadır. Genel anlamıyla hortikültürel terapi, bahçelerin insanların rehabilite edilmesi için kullanılmasıdır. Yeşilin insanlar için olumlu etkilerinin keşfi çok eski zamanlara dayanmaktadır. Hortikültürel terapi milattan önceki dönemden itibaren kullanılan bir yöntemdir. Mezopotamya' da kurulan bahçeler, Orta Çağ Dönemi' nde hasta kişileri iyileştirmek amacıyla ortaya çıkan manastır bahçeleri, yaralı askerlerin sağlık gelişimleri için yeşilin gücünden yararlanması hortikültürel terapiye örnek uygulamalardır (Koçak, 2022). Terapi amacıyla kurulan bahçeler herhangi bir zararlı ürün içermemekte ve her yaşta her cinsiyetteki insanların rahatlıkla zaman geçirebileceği alanlardan oluşmaktadır. Hortikültürel terapinin uygulama alanlarına madde bağımlılığı tedavisinde yararlanılan kurum AMATEM (Alkol ve Uyuşturucu Madde Bağımlıları Tedavi ve Araştırma Merkezi), yaşlı ve engelli bireyler için inşa edilen bakım ve rehabilitasyon merkezleri, ruhsal ve fiziksel sağlıkla ilgili hastaneler gibi çeşitli kurum ve kuruluşlar örnek gösterilebilir. Hortikültürel terapinin gelişimine katkıda bulunan psikiyatrik sosyal hizmet uzmanı ve meslek terapisti Alice Burlinghame, 1950' li yıllarda hortikültürel terapinin uygulama alanları için araçlar geliştirmiş ve bu konuda bilimsel çalışmalar ortaya koymuştur (McDowell,1997). Hortikültürel terapi, kişilere ruhsal anlamda iyi geldiği kadar; fiziksel ve sağlık açısından da olumlu etkiler sunmaktadır. Özellikle hastanelerde bulunan bahçelerin hortikültürel terapi bağlamında kişileri olumlu etkilediği klinik bulgularla kanıtlanmıştır (Yılmaz, 2017). Lu ve arkadaşları demans ve alzeihmer hastalarına hortikültürel terapinin etkisini araştırmış ve çalışmanın sonucunda bahçeyle uğraşarak bunu bir rutin haline getiren bireylerin hastalıklarında olumlu gelişmeler yaşadığını ortaya koymuştur (Lu vd.,2020). Sonuç olarak hortikültürel terapi, bireylerin fiziksel ve ruhsal gelişimleri için bahçelerden yararlanılmasını içermektedir(Filiz, vd., 2020).

- Ekoterapi:

Ekoterapi, doğanın iyileştirici yönünden yararlanarak insanların dönem dönem veya devamlı olarak yaşadığı kaygı bozukluğu, anksiyete, stres, depresyon gibi duygu durumu bozukluklarının tedavi edilmesini içermektedir. Ekoterapi, kişilerin ruhsal durumuna olumlu katkılarda bulunmakla beraber kişilere özgüven artışı, farkındalık ve çevreye duyarlılık sağlamaktadır. Ekoterapinin diğer yöntemlere göre kolay ulaşılabilir olması onu etkili kılan unsurlardandır. Ekoterapiyi uygulamak için bir bahçe sahibi olmanız gerekmez; gökyüzüne bakmanız veya bir ağaç yaprağının rüzgarda dans edişini izlemeniz bile ruhunuzu beslemeniz için yeterlidir. Bu bağlamda ekoterapi; kolay ulaşılabilen, yoksulluk engellilik gibi dezavantajlı durumlardan etkilenmeyen bir yöntem olarak karşımıza çıkmaktadır. Ekoterapinin sağlamış olduğu faydalar yapılan araştırmalarla da desteklenmektedir. Mind' in yaptığı bir çalışmanın sonucuna göre zamanının çoğunu doğayla iç içe geçiren bireylerin % 95' i duygu durumlarının iyileştiğini çok daha rahat ve stressiz bir ruh haline büründüklerini ifade etmektedir (SuCo., 2020). Aynı şekilde Brazier tarafından gözlemlenen ekoterapi seansında; ormanda vakit geçiren bir grup insanın karıncaların yardımlaşarak çalışma stillerini gözlemlemesiyle birlikte kişilerde olumlu sonuçların ortaya çıktığı ve çevreye dair farkındalık düzeylerinin arttığı sonucuna ulaşılmıştır (Brazier, 2011). Faydaları hakkında bilgiler verilen ekoterapiyi hayatımıza dâhil etmek ve doğada daha fazla verimli zaman geçirebilmek için;

- ✓ Evinize en yakın yeşil alanda en az 30 dakika yürüyüş yapmak,
- ✓ Eğer işiniz ve vaktiniz buna uygunsa laptop veya kitaplarınızla beraber en azından bir saat doğada çalışmak, ilham kaynağınızı doğada bulmak,
- ✓ İlgilendiğiniz bir sanat dalı veya hobileriniz var ise bunu bazı zamnlar doğada uygulamak,
- ✓ Pilates, yoga, meditasyon, egzersiz gibi fiziksel aktiviteleri orman, sahil kenarı veya bir parkta gerçekleştirmek,
- ✓ Bitki sahibi olmak ve evdeki bitkiler ile ilgilenmek,
- ✓ Doğada geçirdiğiniz vaktin size neler hissettirdiğini anlattığınız bir doğa günlüğü tutmak önerilmektedir (SuCo., 2020).

Sonuç olarak ekoterapiyi anlamak ve yaşamımızın bir bölümünde doğaya yönelerek farkındalık kazanmak fiziksel, ruhsal ve zihinsel anlamda bizlere fayda sağlamaktadır. Ekoterapinin sınav kaygısı nedeniyle yeme bozukluğu yaşayan bir gence, yalnızlık ve ölüm korkusu nedeniyle depresyonda olan yaşlı bireye, ekonomik yoksulluğu nedeniyle akran zorbalığına uğramış bir çocuğa, tümör tedavisi alan bir kanser hastasına kısacası fiziksel veya ruhsal anlamda zorluk yaşayan tüm insanlara iyi geleceği unutulmamalıdır.

- Yeşil Egzersiz:

Orman, park, bahçe, sahil gibi yapaylıktan uzak doğal ortamlarda yapılan egzersizleri içermektedir. Doğal ortamlarda gerçekleştirilen egzersizlerin insan sağlığına fiziksel ve ruhsal etkisi yadsınamaz bir gerçektir. Yapılan araştırmalar doğada vakit geçirmenin kişinin biyolojik, fizyolojik ve ruhsal sağlığını olumlu yönde etkilediğini ve yeşil egzersiz uygulamasının bir sonucu olarak insanların doğayı sahiplenme ve koruma isteğinin arttığını ortaya koymaktadır. İnsanoğlu yüzyıllardır doğa ile iç içe olmuş, barınma, gıda ve bakım ihtiyacını doğadan karşılamıştır. Doğa ile insan arasındaki bağ avcı toplayıcı döneme kadar uzansa da; yeşil egzersiz kavramı güncel bir tanımlama olarak karşımıza çıkmaktadır. Yeşil egzersiz sürdürülebilir bir uygulama olup insan sağlığını olumlu etkilemesi ve doğayı koruma konusunda farkındalık yaratması bakımından önemli bir uygulamadır (Durusoy, vd., 2021).

- Macera Terapisi:

Macera terapisi, terapotik müdahale amacıyla kişilerin aksiyon alarak doğada vakit geçirmesini içermektedir. Keskin' göre macera terapisi, müracaatçıların macera olarak algıladığı, danışmanlar tarafından kasıtlı olarak seçilen, kontrol altındaki riskli faaliyetlere dayanan bir psikolojik müdahale biçimidir. Yeni bir yaklaşım olan macera terapisi, bireylerin ruhsal iyilik hali için uygulandığından daha çok rehberlik alanında faaliyet göstermekle beraber bazı ülkelerde de sosyal hizmet uygulaması olarak yürütülmektedir (Keskin, 2021). Kişilere yaşayarak öğrenme imkanı sunan macera terapisinde müracaatçıların macera etkinliklerine doğrudan katılım sağlaması terapi sürecinin etkili olmasında temel unsurdur. Deneyimleyerek öğrenme metodu sayesinde katılımcılar terapi boyunca cesaret, meydan okuma gibi öz gelişimlerini olumlu yönde etkileyecek sonuçlar elde etmekte ve başarı hissi ile beraber yeni kazanımlara istekli olmaktadır. Doğanın kendiliğinden gerçekleşen yağmur, fırtına gibi olayları, katılımcıların sorunlarla baş etme stilini geliştirmektedir. Macera terapisi faaliyetleri, problem çözme becerilerini geliştirerek açık hava macera aktivitelerini (kaya tırmanışı, halatla iniş, rafting, mağaracılık ve ormanda yürüyüş gibi) ve sırt çantasıyla seyahat, rafting, kayak turu ve/veya karlı uzun gece gezilerini içerebilmektedir. Yapılan araştırmalar sonucunda güncel bir yaklaşım olmasına rağmen macera terapisinin, zihinsel ve sağlık sorunlarının tedavisinde etkili olduğu görülmüştür (Bowen, vd., 2016). Macera terapisi uygulama şekillerine göre üç farklı kategoriye ayrılmaktadır: Macera temelli terapi, vahşi doğa terapisi ve terapötik kamplar. Macera temelli terapi, şehre yakın ormanlık alanlarda yapılan riskli aktivitelerdir. Vahşi doğa terapisi ise kişilerin içsel durumunu, özünü keşfetmek amacıyla doğaya yönelmesidir. Adından da anlaşılacağı üzere vahşi doğa terapisi; doğanın merkezine inerek ıssız ve sakin bir ortamda biyoçeşitliliğin farkına varmaktır. Bu farkındalık bireye ruhsal ve fizyolojik anlamda olumlu katkılar sağlamaktadır. Vahşi doğa terapisi için genellikle şehirden uzak ormanlık alanlar tercih edilmektedir. Son olarak terapötik kamplar, doğanın iyileştirici yönüne inanan ve ruhunu beslemek isteyen kişilerin çadırlarda veya

barınaklarda kaldığı ve daha uzun süreli macera etkinliklerine katıldığı yöntemdir (Gass, vd, 2012).

Bowen ve arkadaşlarının oluşturduğu örnek plana göre; macera terapisinde ilk hafta veli, öğrenci ve öğretmen tanışması, grup toplantıları yapılmaktadır. İkinci haftada fiziksel aktivitelere başlandığı gece keşfine çıkıldığı görülmektedir. İlerleyen zamanlarda da rafting, doğa yürüyüşü, kaya tırmanışı gibi aktiviteler yapılmaktadır. Terapinin sonuna gelindiğinde tüm katılımcılardan geribildirimde bulunmaları istenir ve öz farkındalık sağlanarak terapi süreci sonlandırılır (Bowen, vd., 2016). Macera terapisi, grup çalışması olarak yürütüldüğünden ve benzer amaçları taşıdığından sosyal hizmet müdahale yöntemlerine uygun bulunmaktadır. Bu terapi yöntemi ile bireyler, doğadan ilham alarak doğadaki canlıların uyum içerisinde yaşadığının farkına varmakta bu sayede iyileşme sürecine geçmekte ve grup içi yardımlaşma\dayanışma becerilerini geliştirmektedir. Ayrıca yabani doğa terapisi, doğa ve sanat, açık hava etkinlikleri gibi yeşil alanda uygulanan ekoterapi uygulamalarının travma sonrası stres bozukluğu (TSSB) ile başa çıkmaya çalışan gaziler için oldukça etkili olduğu kanıtlanmıştır (Ak, 2021).

4. Ekopsikoloji ve Sosyal Hizmet

Sosyal hizmet; insan hakları, sosyal değişim, sosyal adalet gibi değerleri vurgulayarak ilerici yaklaşımlar sergileyen ve daha çok radikal veya aktivist çağrışımlara sahip bir meslektir (Briskman, vd., 2022). Sosyal hizmetin kültür ve sosyal çevre ile ilişkisi göz önünde bulundurulduğunda farklı uygulama alanlarında farklı müdahale yöntemlerinin uygulanıyor olması, sosyal hizmetin spesifik nitelikleri arasında yer almaktadır. Sosyal hizmet yaşlı bakımı, madde bağımlılığı tedavisi, insan hakları savunuculuğu gibi disiplinlerarası alanlarda da yeri olan bir meslektir. Bu bağlamda güncel bir kavram olan ekopsikoloji, var olan sosyal hizmet uygulamalarına farklı bir uygulama alanı sunması bakımından önemlidir. Bilindiği üzere ekopsikoloji, insan yaşamı ile doğayı ortak bir noktada buluşturmayı ve kişileri doğayla barıştırmayı hedeflemektedir.

Ekopsikoloji ve sosyal hizmet arasında ortak noktalar mevcuttur ve en önemli olanı ikisinde de eklektik bilgilerin varlığıdır (Park, 1996; aktaran Filiz,2020).Her iki alanda farklı türde uygulamaları ve tarzları barındırmaktadır. Ekopsikoloji ve sosyal hizmetin bir arada düşünülmesi aynı amacı taşımaları ve uygulama tekniklerinde bazı ortak noktaları taşımalarından kaynaklanmaktadır. Örneğin ekopsikoloji uygulamaları, dil, inanç sistemi, yaş ayrımı gözetmeksizin bütün insanlar için uygulanabilir bir yöntemdir.

Ekopsikoloji insanların sosyal refahını arttırmayı ve iyilik haline ulaşılmasını amaç edinmekte ve bu noktada da sosyal hizmet ile örtüşmektedir. Sosyal hizmetin önemli yaklaşımlarından olan güçlendirme, ekopsikoloji uygulamalarında da görülmektedir. Güçlendirme, kişilere kendi hayatları ve yaşam şartları üzerinde daha büyük kontrol kazanmaları için yardım etmek şeklinde tanımlanabilmektedir (Thompson, 2007). Ekopsikoloji uygulama çeşitlerinde de güçlendirme yaklaşımına rastlanmaktadır. Örneğin macera terapisinde bireyler zorluklar karşısında içindeki güç potansiyelinin farkın varmakta ve kendi hayatlarını kontrol edebilme, sorumluluk alma konusunda beceriler kazanmaktadır.

1970’ lerden itibaren sosyal hizmet mesleğine önemli katkılar sağlayan ve farklı bir bakış açısı sunan ekolojik sistem kuramı, kişilerin yaşadığı çevrenin, kültürün veya aile gibi yaşam sistemini oluşturan yapıların insanların duygu durumunu etkilediğini ve bununla beraber yaşanan sorunlarında çevresi içerisinde birey perspektifi ile değerlendirilmesi gerekliliğini savunmaktadır(Acar,2002). Ekopsikoloji, kişinin ruhsal ve fiziksel iyilik halinin doğrudan çevre sile ilişkili olduğunu savunmaktadır. Bu nedenle duygusal ve fiziksel rahatsızlıklar, insanlar doğa ile ilişkisini kestiğinde artış göstermektedir (Filiz, 2020). Bu noktada sosyal hizmet ve ekopsikoloji çevrenin insan yaşamı üzerindeki etkisi konusuna vurgu yapmakta ve terapötik bir yaklaşım olan ekopsikoloji, ekolojik sistem kuramı bağlamında sosyal hizmet uzmanlarına yeni bir bakış açısı sunmaktadır. Ekolojik sistem yaklaşımı aynı zamanda kişilerin var olduğu sistemi korumasını ve sorumluluk almasını da sağlamaktadır. Doğayı ve doğada bulunan canlıların yaşam kalitesinin insanların yaşam kalitesi ile eşdeğer olduğu görüşünden hareketle danışanlar, tedavinin merkezinde doğanın yer aldığı ekoterapi gibi uygulamaları etkili bulmaktadır.

Ekopsikoloji uygulamasının sosyal hizmet mesleğine farklı bir bakış açısı kazandıracağı ve mesleğin sürdürülebilirliğine katkı sağlayacağı görülmektedir (Barut vd.,2020). Tüm bunlardan hareketle sosyal hizmet uygulamalarının işlerliğinin artması ve dört duvardan oluşan terapi odalarına bir alternatif sunarak doğal çevrede müdahalenin gerçekleşmesinin kişilerin problemleri ile baş etmesini kolaylaştıracağı görülmektedir. Ek olarak ekopsikoloji hakkında daha fazla bilgi sahibi olunması dezavantajlı kişiler için önem arz etmektedir çünkü ekopsikoloji ulaşılabilirliği yüksek bir terapi yöntemi olup, her yerde ve her zaman insanın iyilik halini arttırma konusunda yararlanılabilecek bir alan olarak karşımıza çıkmaktadır.

5. Sonuç

Ekopsikolojinin amaç ve felsefesi tam olarak anlaşıldığında sosyal hizmetin müdahale teknikleri ile aynı çerçevede değerlendirilmesinin insan sağlığı ve sosyal çevresine katkıda bulunacağı görülmektedir. Çalışmanın içeriğini oluşturan ekopsikoloji ve sosyal hizmet kavramlarının bir arada düşünülmesi, sosyal hizmet müdahale yöntem ve tekniklerine yeni bir bakış açısı kazandıracaktır. Sosyal hizmet dezavantajlı bireylerin iyilik halini arttırmayı ve hak savunuculuğunu üstlenen bir meslek olmakla beraber hiçbir ayrım gözetmeksizin her insanın özel ve biricik olduğunu savunmaktadır. Ekopsikolojinin temel yaklaşımı ve amacı da aynı şekilde kişilerin doğal ortam aracılığıyla iyilik halinin arttırılmasıdır. Ekopiskolojinin gelişimi ile beraber, ülkemizde uygulanan pek çok tedavi yönteminin danışanlar tarafından farkındalık düzeyi artacak ve kişilere daha sürdürülebilir bir hizmet sunulacaktır.

Güncel bir yaklaşım olan ekopsikolojinin uygulama yöntemlerine ülkemizde çok fazla rastlanmamaktadır (Keskin, 2021). Hastanelerde bulunan ve hortikültrel terapiye örnek oluşturan bahçeler, okullarda çocuklara doğa sevgisini kazandırmak amacıyla yapılan yeşillik alanlar, Gençlik ve Spor Bakanlığı tarafından gerçekleştirilen deniz ve doğa kampları kişi ve grup temelli tedavilere örnek gösterilebilmektedir. Ancak bu tedavilerin ekopiskoloji bağlamında değerlendirilmesi için bu kavramın farkında olarak uygulamaların gerçekleştirilmesi elzemdir. Ekopsikoloji hakkında yürütülen akademik çalışmaların genel durumunu açıklamak amacıyla gerçekleştirilen bir çalışmada, son yıllarda bu konu ile ilgili çalışmaların arttığı görülmüş ve buna bağlı olarak da son yıllarda doğaya saygının, duyarlılığının, çevre bilincinin artış gösterdiği sonucuna ulaşılmıştır (Metin, 2023). Psikoloji sosyoloji, sosyal hizmet gibi toplum ve insan sağlığı üzerine çalışmalar yürüten meslekler, ekopsikolojiyi anlamak ve anlatmak konusunda istikrar sağladığı müddetçe ülkemizde ekopsikoloji çok daha etkin bir terapötik müdahale yöntemi haline gelecektir. Bu bağlamda sosyal hizmet uygulamasında ekopsikolojiyi değerlendirmek ve uygulama odağında yer vermek, kolay ulaşılabilir ve sürdürülebilir müdahale yöntemi sunması bakımından önemli görülmektedir.

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RESP

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Araştırma Makalesi ● Research Article

Modeling Recycling Behavior of Turkish Households: An Application of The Theory of Planned Behavior

Türk Hanehalklarının Geri Dönüşüm Davranışlarının Modellenmesi: Planlı Davranış Teorisinin Bir Uygulaması

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ANAHTAR KELİMELER

Yapısal eşitlik modellemesi
Planlı davranış teorisi
Niyet
Geri dönüşüm
Davranış

ÖZ

Bu çalışma, hane halkı geri dönüşümünü etkileyen faktörleri anlamak için Türk hanelerinin geri dönüşüm niyet ve davranışlarını incelemektedir. Katı atıklar, küresel ekonomiyi ve çevreyi önemli ölçüde etkilemektedir ve geri dönüşümü atık yönetimi açısından hayati hale getirmektedir. Türkiye'de hanehalklarının geri dönüşüm davranışlarına ilişkin araştırmalar sınırlı olmasına rağmen, bu faktörlerin anlaşılması daha etkili geri dönüşüm programlarının oluşturulmasına yol açabilir. Planlı Davranış Teorisi uygulanarak, çevrimiçi bir anket rastgele örnekleme yöntemi kullanılarak 415 Türk hanehalkına dağıtılmıştır. Hanehalklarının geri dönüşüm niyetleri ve davranışları Yapısal Eşitlik Modellemesi kullanılarak analiz edilmiştir. Bulgular, geri dönüşümle ilgili davranışın, Türk hane halkının niyetlerinden, tutumlarından, öznel normlarından, sonuçların farkındalığından, endişesinden ve algılanan davranışsal kontrolünden etkilendiğini göstermektedir. Bu çalışma, Türkiye'de sürdürülebilir geri dönüşüm uygulamalarını teşvik etmek için bu faktörlerin ele alınmasının önemini vurgulamaktadır.

KEYWORDS

Structural equation modeling
Theory of planned behavior
Intention
Recycle
Behavior

ABSTRACT

This study examines the recycling intentions and behaviors of Turkish households to understand the factors influencing household recycling. Solid waste significantly impacts the global economy and environment, making recycling crucial for waste management. Despite limited research on household recycling behavior in Türkiye, understanding these factors can lead to more effective recycling programs. Applying the Theory of Planned Behavior, a self-reported online questionnaire was distributed to 415 Turkish households using random sampling. The recycling intentions and behaviors of households were analyzed using Structural Equation Modeling. The findings indicate that recycling-related behavior is influenced by intentions, attitudes, subjective norms, awareness of consequences, concern, and perceived behavioral control of Turkish households. This study highlights the importance of addressing these factors for promoting sustainable recycling practices in Türkiye.

1. Introduction

Numerous critical environmental challenges pose threats to the well-being of both humanity and the planet's diverse species. These pressing environmental concerns encompass issues such as soil, air, and water pollution, deforestation, desertification, biodiversity loss, overexploitation of natural resources, and the escalating issue of unmanageable solid waste. The correlation between population growth, consumption patterns, and their repercussions has been a topic of extensive scholarly discourse (Alhassan et al., 2018). A wealth of research underscores that the surge in

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waste production and the unsustainable utilization of resources exert adverse impacts on both the environment and the global economy (Shevchenko et al., 2019).

Scholarly attention has underscored that the challenge of solid waste stemming from consumables, be it food or non-food items, necessitates concerted national and international solutions (Botetzagias et al., 2015). The growing body of literature underscores the paramount significance of efficacious solid waste management strategies. Therefore, the imperative lies in addressing human needs in a manner that aligns with ecological responsibility.

Recent insights from a systematic literature review pinpoint three pivotal techniques for curbing solid waste: reduce, reuse, and recycling (EPA, 2021). Among these, recycling assumes a foremost role in the realm of waste management (EPA, 2021). Recycling, denoting the recovery and conversion of useful materials such as paper, glass, plastics, and metals from Municipal Solid Waste (MSW) into new products to mitigate the demand for virgin raw materials, constitutes a key approach (EPA, 2021). Essentially, recycling integrates discarded materials into the manufacturing process through diverse means (Bezzina & Dimech, 2011). The methods encompass waste avoidance, reduce at the source, and recycling when waste generation is inevitable. A comprehensive analysis by Chan & Bishop (2013) underscores the multifaceted benefits of recycling, spanning economic considerations, prudent resource utilization, and energy conservation. As highlighted by Ara et al. (2021), recycling stands as a pivotal strategy to mitigate excessive waste disposal and the burden on landfills. Summing up the discourse thus far, recycling emerges as a yardstick for a nation's ecological consciousness and its commitment to waste abatement.

While recycling is firmly rooted in the practices of numerous developed nations, particularly within the European Union (EU), Türkiye's documented recycling rate remains notably lower than the EU average. Eurostat data reveals that the average municipal waste recycling rate across the EU-27 stands at 47.7%, whereas only around 11.5% of Türkiye's municipal waste was recycled in 2019. Noteworthy recycling champions in Europe include Germany, Slovenia, and Austria, with Germany projected to recycle 67.7% of its municipal waste (EUROSTAT, 2020). In accordance with municipal waste management statistics, the aggregate volume of waste collected across three significant provinces is reported as follows: 6,552,701 tons in Istanbul, 1,956,586 tons in Ankara, and 1,983,465 tons in Izmir. Subsequent analysis indicates that the total waste generated in Istanbul has been exclusively directed to waste processing facilities, while 1,941,086 tons from Ankara and 1,972,425 tons from Izmir have also undergone waste processing procedures (TURKSTAT, 2023). Notably, the expansion of recycling efforts in Türkiye corresponds to the advancement and execution of the Zero Waste Project, a comprehensive national endeavor aiming to reduce waste generation, foster recycling practices, and establish sustainable waste management strategies across the country (Zero Waste, 2023).

The complex interaction between human behavior and environmental challenges has an impact on studies to be carried out, especially in the field of recycling (Roy & Pal, 2009). Household actions emerge as a critical determinant in the success of recycling efforts (Davis et al., 2006). Positive attitudes and behaviors within households regarding recycling not only play a pivotal role in addressing pollution but also enhance the symbiotic relationship between economic and environmental gains. The cost-effectiveness of sorting recyclables at the household level, in contrast to centralized sorting facilities, underscores the importance of comprehending recycling behaviors at this foundational level. The effectiveness of recycling initiatives hinges on a thorough understanding of household perceptions toward recycling (Knussen et al., 2004; Tonglet et al., 2004b). In conclusion, recognizing and addressing household attitudes and behaviors toward recycling is crucial for the success of recycling initiatives, as they not only contribute to pollution reduction but also strengthen the interdependence between economic and environmental benefits.

Given the manifold benefits of recycling, promoting broader participation becomes paramount. This underscores the role of psychological behavioral theories (Chan & Bishop, 2013). Within this context, the Theory of Planned Behavior (TPB) has served as a framework for understanding household behaviors, particularly recycling behaviors. To facilitate effective solid waste management strategies, delving into household recycling practices is crucial, as evidenced by prior research. Notably, there is a dearth of comprehensive studies probing Turkish household recycling behaviors at the national level.

While Yilmaz et al. (2021) investigated recycling behaviors in Istanbul, Ankara, and Izmir, and Sorkun (2018) explored the influence of social norms on recycling in Seferihisar, Izmir, and Arı & Yılmaz (2016) scrutinized recycling behaviors of housewives in Eskişehir, these localized studies may not holistically capture Türkiye's diverse dynamics. Hence, this survey, encompassing households from Istanbul, Ankara, and Izmir, aims to offer a broader understanding at the national level. The purpose of this study to investigate the relationship between recycling behaviors and the Theory of Planned Behavior, aiming to discern the factors influencing individuals' intentions and actions regarding recycling practices. The study seeks to enhance our understanding of the psychological mechanisms underlying recycling behaviors, ultimately contributing to the development of targeted interventions and strategies to promote sustainable waste management practices in line with the Theory of Planned Behavior. Therefore, the main question of this study is, “What are the drivers affecting the intention and behavior of Turkish households regarding recycle?”. In this context, this study aims to analyze Turkish households’ recycle-related behaviors with the help of the

TPB.

2. Theoretical Background, Prior Literature and Hypothesis

Higher levels of domestic consumption have been closely linked to an upsurge in solid waste generation. Encouraging households to engage in recycling becomes imperative in curbing the escalation of solid waste production. Extensive literature substantiates that human behavior assumes a pivotal role in recycling practices and underscores the potential for altering household behavior to mitigate solid waste production (Roy & Pal, 2009). Consequently, investigations into household behavior have gained prominence. The realm of household behavior is intricate and multifaceted, influenced by a myriad of factors. Various theoretical frameworks have been introduced in the literature to explain recycling behavior. Notable among them are the Norm Activation Model (Schwartz, 1973), the Theory of Value-Belief-Norm (Stern, 2000), and the Theory of Planned Behavior (TPB) (Ajzen, 1985), the latter being the most widely embraced for comprehending pro-environmental behavior (Armitage & Conner, 2001). TPB is a social psychological theory that aims to explain and predict human behavior based on individuals' attitudes, subjective norms, and perceived behavioral control. The theory was developed by Icek Ajzen as an extension of his earlier work on the Theory of Reasoned Action. The key components of the Theory of Planned Behavior are attitude toward behavior, subjective norms, and perceived behavioral control. Attitude Toward Behavior refers to an individual's positive or negative evaluation of performing a particular behavior. It includes beliefs about the outcomes of the behavior and the subjective value attached to those outcomes. Subjective norms capture the perceived social pressure or influence an individual feels from others to perform or not perform a certain behavior. It includes beliefs about whether important referents (such as friends, family, or colleagues) approve or disapprove of the behavior and the individual's motivation to comply with these perceived norms. Perceived Behavioral Control reflects an individual's perception of the ease or difficulty of performing a behavior. It takes into account factors such as the individual's self-efficacy (confidence in their ability to perform the behavior) and the presence of facilitating or hindering factors. The intention to perform a behavior is considered the immediate precursor to actual behavior in the TPB. Intention is influenced by attitudes, subjective norms, and perceived behavioral control. Additionally, perceived behavioral control directly influences behavior. It's important to note that the Theory of Planned Behavior assumes that individuals are rational decision-makers who consider the implications of their actions and that their intentions are the best predictors of their behavior (Ajzen, 1985). The TPB, acknowledged for its versatility, has been extensively scrutinized as a dependable predictor of diverse behaviors, encompassing environmental actions such as water conservation (Lam, 2006), waste reduction (Bortoleto et al., 2012), food waste recycling (Mak et al., 2018), and household waste segregation (Knussen et al., 2004). Its application to recycling behaviors within households has fostered a substantial and growing body of literature, with notable contributions from researchers such as Alhassan et al. (2018), Strydom (2018), and Muniandy and Anuar (2020), who have employed the TPB to assess household recycling and waste separation practices. It is pertinent to underscore, however, that no comprehensive nationwide studies employing this approach have been conducted in the context of Türkiye.

The TPB (see Figure 1) stands as a psychological framework utilized to predict and explicate human behavior. Originating in the 1980s through the work of Icek Ajzen, the TPB is grounded in the premise that attitudes, subjective norms (SN), perceived behavioral control (PBC), and intentions collectively shape behavior. According to the TPB, an individual's intention to perform a particular activity emerges as the most substantial precursor to the actualization of said behavior. This intent is molded by attitudes, SN, and PBC. Notwithstanding its widespread adoption, researchers have consistently refined the theory due to its inherent limitations. For instance, extant research suggests the incorporation of novel variables to enhance the theory's explanatory power (Boldero, 1995; Davies et al., 2002; Tonglet et al., 2004b). Notably, in Türkiye, no comprehensive national investigation has explored the origins and ramifications of attitudes, SN, and PBC concerning recycling-related behavior. To deepen the comprehension of recycling behavior, researchers have incorporated additional variables into the model (Bezzina & Dimech, 2011). Thus, this study introduces two supplementary components, namely awareness of consequences (AC) and concern, into the model to more comprehensively characterize household recycling behavior.

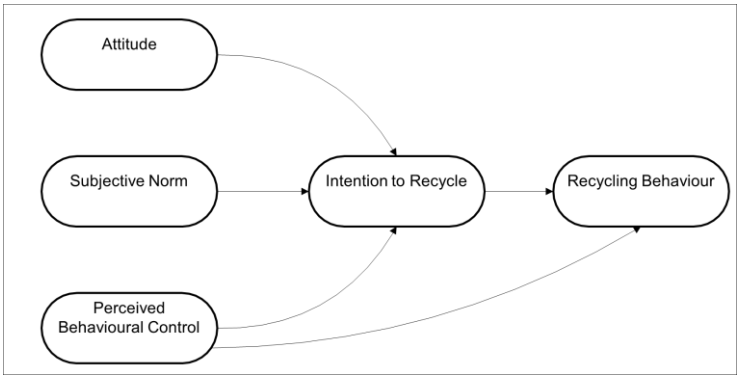

Figure 1. Theory of Planned Behavior (Ajzen, 1985; Strydom, 2018).

The established predictors within Ajzen's TPB, alongside the newly introduced variables, constitute the foundation of this study's model. Within this framework, Turkish households' recycling behaviors are explored through structural equation modeling. Attitudes, AC, SN, concern, and PBC within the TPB are all subjected to evaluation. The

model serves as a tool to assess the hypotheses formulated within the study's scope (H_1, H_2, H_3, H_4, H_5, H_6, H_7).

In Ajzen's TPB model, attitudes, intentions, PBC, and SN collectively influence the evolution of behavior. The initial hypothesis (H_1) of the TPB model probes the impact of intention on behavior. Existing research suggests a positive relationship between households' recycling intentions and their recycling-related behaviors.

H_1: Households' intention to recycle influences their recycling behavior.

Building upon Ajzen's TPB, the primary variables presumed to shape intention are posited as a continuation of the initial hypothesis. Attitudes, SN, and PBC are all poised to predict intention. Attitudes, AC, SN, concern, and PBC emerge as potential drivers of intent. Attitudes reflect an individual's inclination to engage in a behavior, shaped by their perceptions of the behavior's consequences and their valuations of those outcomes. For instance, a person might be more inclined to recycle if they perceive it as environmentally beneficial and attach significance to environmental preservation. Prior empirical investigations into the association between attitudes and recycling behavior have yielded divergent findings. While some researchers (Ramayah et al., 2012; Pakpour et al., 2014; Alhassan et al., 2018; Strydom, 2018; Muniandy & Anuar, 2020) have found a linkage between individual attitudes and recycling behavior, others (Davis et al., 2006) have reported a lack of predictive relationship. Within the framework of Ajzen's TPB, attitudes wield considerable influence over intention (H_2).

H_2: Households' attitudes toward recycling impact their recycling intentions.

Subjective norms (SN) encompass perceived social pressures that either promote or discourage engagement in a specific action. Positive peer and family endorsements of a behavior can heighten an individual's likelihood of adopting it. Empirical investigations by Mahmud & Osman (2010), Ramayah et al. (2012), Pakpour et al. (2014), Alhassan et al. (2018), Strydom (2018), and Muniandy & Anuar (2020) have indicated that subjective norms significantly influence individuals' recycling behavior. Conversely, researchers such as Knussen et al. (2004) and Tonglet et al. (2004b) have contested the explanatory power of social norms in understanding recycling behavior. This study aims to ascertain whether the recycling attitudes of others exert an impact on the recycling intentions of Turkish households (H_3).

H_3: Households' subjective norms regarding recycling have an effect on their recycling intentions.

Perceived behavioral control (PBC) reflects an individual's conviction in their ability to enact a specific behavior. A person is more likely to recycle if they perceive themselves to possess the necessary resources and competencies. Unlike SN and attitude, PBC can exert influence over both behavior and intention. As per researchers including Chan & Bishop (2013), Pakpour et al. (2014), Strydom (2018), and Muniandy & Anuar (2020), an individual's perception of PBC significantly impacts their recycling behavior. However, findings have been mixed, with some studies (Boldero, 1995; Davies et al., 2002; Ramayah et al., 2012; Muniandy & Anuar, 2020) reporting no significant role for perceived behavioral control in explaining recycling behavior. Mahmud & Osman (2010), Wan et al. (2014), Botetzagias et al. (2015), and Kumar (2019) have demonstrated the influence of PBC on individuals' recycling intentions. Conversely, other researchers (Davies et al., 2002; White & Hyde, 2012; Strydom, 2018) have found limited impact of PBC on recycling intentions. Moreover, intention has been recognized as an antecedent to recycling behavior. Scholars such as Wan et al. (2012), Chan & Bishop (2013), Pakpour et al. (2014), and Strydom (2018) have attested to the relationship between individuals' recycling behavior and their intentions. In this light, PBC is anticipated to have a bearing on both intention and behavior (H_4, H_5).

H_4: Households' perceived behavioral control over recycling impacts their recycling intentions.

H_5: Households' perceived behavioral control over recycling influences their recycling behavior.

In addition to the core variables of Ajzen's TPB, the study posits the introduction of supplementary variables to enhance the predictive power of intention, aligning with prior recycling research. AC and concern are identified as potential further drivers of behavior. AC is posited to impact recycling behavior. While Tonglet et al. (2004a), Wan et al. (2012), Wan et al. (2014), Lizin et al. (2017), and Wan et al. (2017) have established a link between AC and recycling behavior, Kumar (2019) has found no evidence of AC shaping recycling behavior. Tonglet et al. (2004a, b) have identified no significant relationship between AC and intention. Davis et al. (2006), for instance, discovered no substantial correlation between AC and intention in the context of Brixworth. Concern, as noted by Tonglet et al. (2004a, b), Wan et al. (2012), Wan et al. (2014), Lizin et al. (2017), and Wan et al. (2017), influences individuals' recycling behavior. However, Davis et al. (2006) reported limited positive correlation between concern and intention in West Oxfordshire District Council. Within the framework of Ajzen's TPB, AC and concern are projected to exert significant influence on intention (H_6, H_7).

H_6: Households' awareness of consequences regarding recycling impacts their recycling intentions.

H_7: Households' concern regarding recycling influences their recycling intentions.

3. Material and Methods

3.1. Questionaire, Variables, Scale, and Research Design

To comprehensively investigate the recycling behaviors of Turkish households within the framework of the Theory of Planned Behavior (TPB), a quantitative research methodology was employed in this study. Data collection was facilitated through Google Forms, leveraging an online survey conducted between August and September 2020. Structured questionnaires were employed to elicit information regarding sociodemographic characteristics and contextual factors intertwined with household recycling practices. The ensuing section within the results presents statistical details encompassing variable nomenclature, variable grouping, and response rates.

Moreover, the survey meticulously explored an array of aspects, encompassing recycling-related behaviors, intentions, attitudes, subjective norms (SN), perceived behavioral control (PBC), awareness of consequences (AC), and concern – all constituting potential factors within the TPB framework. Consistent with previous research grounded in the TPB (Tonglet et al., 2004b; Yılmaz et al., 2010; Bezzina & Dimech, 2011; Ramayah et al., 2012; Wan et al., 2012; Oztekin et al., 2017; Wan et al., 2017; Arli et al., 2019), the survey featured inquiries gauged through the utilization of the Likert scale (Likert, 1932). Within this scale, a 5-point continuum was employed to denote the spectrum of responses, wherein 5 signifies strong agreement and 1 signifies strong disagreement, serving as a metric to express the mean of the survey items.

3.2. Research Area and Sampling

Türkiye spans both Anatolia and the Balkan peninsula, as depicted in Figure 2, which provides a city map featuring key locations such as Istanbul, Ankara, and Izmir.

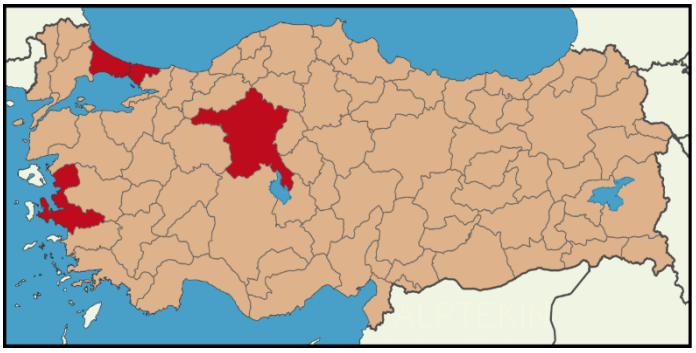

Figure 2. Map of Türkiye and Cities Included in the Study

To ensure the collection of a representative sample from the Turkish population, random probability sampling was adopted. According to TURKSTAT's 2020 statistics, Türkiye's population was estimated at approximately 83,614,000. Employing a 5% sampling error, a 95% confidence interval, and a 50% standard population proportion, a minimum sample size of 383 was established (Krejcie & Morgan, 1970). This study successfully garnered responses from 415 households across Türkiye. Notably, a robust assessment confirmed the reliability and validity of all questionnaires employed during the survey phase. The majority of respondents hailed from Istanbul (61.0%), Ankara (22.0%), and Izmir (17.0%)—the three most populous cities in Türkiye. Importantly, during the survey period, these three provinces accounted for 30.3% of Türkiye's total population.

Table 1 encapsulates the demographic information concerning the sample populace in relation to Türkiye's entire population in 2020. Pertinent data concerning Türkiye's fundamental population attributes—such as age, household size, per capita income, and gender—were sourced from the official statistics website (TURKSTAT, 2020). With the exception of age and educational attainment, the chosen sample aligns closely with the broader Turkish population across key parameters. Broadly speaking, the survey respondents, predominantly adults aged between 18 and 65, exhibit a notably high level of educational attainment. The educational level of participants can potentially influence their intentions and behaviors, according to the TPB. The TPB suggests that behavioral intentions are influenced by three main factors: attitudes toward the behavior, subjective norms, and perceived behavioral control. Education can play a role in shaping these factors. Highly educated individuals may have different attitudes toward certain behaviors based on their knowledge and understanding. Education can influence how they perceive the importance, benefits, or drawbacks of a particular behavior. The social context, including the influence of peers, family, and society, can be shaped by education. Highly educated individuals may be part of social circles where certain behaviors are more or less accepted, and this can influence their subjective norms. Education can also impact individuals' perceived control over a behavior. Highly educated individuals may feel more in control due to their knowledge and skills, or they may perceive certain behaviors as more or less feasible based on their education level. Noteworthy research comparing online and face-to-face surveys has highlighted the potential for online surveys to attract a higher proportion of educated respondents (Vaske et al., 2011). Consequently, the educational levels of the respondents exceed the Turkish average.

Table 1. Some Fundamental Participant Characteristics and Their Comparison to the General Population

Characteristics	Sample	Population*
Age	Between 18- 64 years (100 %)	Under 18 years (29,5 %) Between 18- 64 years (61,0 %) 65 years and up (9,5 %)
Household size (mean)	3.3 person	3.3 person
Per capita income (mean)	900 $** and less (91,6 %)	900 $** and less (86,2 %)
Household income (mean)	2820 $** and less (92,0 %)	2820 $** and less (93,4 %)
Gender	52,0 % of women, 48,0 % of men	54,8 % of women, 45,2 % of men

*Population data derived from the Turkish Statistical Institute

(TURKSTAT, 2020) ** 1 $ = Average 8.87 Turkish Liras in 2021 (CBRT, 2022).

3.3. Analysis Methods

Upon the completion of the study questionnaires, the primary data extracted from the questionnaires were subjected to analysis. The Statistical Package for the Social Sciences (SPSS) was enlisted for Reliability Analysis and other fundamental statistical evaluations. Additionally, the Linear Structural Relations (LISREL) program was harnessed to conduct Structural Equation Modeling (SEM) and Confirmatory Factor Analysis (CFA). The appraisal of reliability and validity of the variables anchored on the 5-point Likert Scale (Likert, 1932) was accomplished through reliability analysis. This analytical technique scrutinizes response consistency to ascertain the robustness and validity of survey participant inputs (Field, 2013). The Cronbach Alpha coefficient, a widely employed measure, was utilized in the reliability analysis. Devised by Lee Cronbach in 1951, the alpha coefficient gauges the internal consistency of a scale or test, manifesting as a value between 0 and 1. In the context of scales used in household behavior research, an alpha range of 0.00 to 0.40 is categorized as "not reliable," 0.40 to 0.60 as "low reliability," 0.60 to 0.80 as "moderately reliable," and 0.80 to 1.00 as "highly reliable" (Cronbach, 1951).

The statistical methodology of SEM serves as a potent avenue for evaluating and estimating interrelationships among variables. This versatile tool is applicable across diverse data types, encompassing continuous and categorical variables. Across disciplines such as psychology, sociology, marketing, and education, SEM is leveraged extensively, facilitating the exploration of intricate data interplays and enhancing comprehension of factors underpinning diverse behaviors. SEM hinges upon a constellation of structural equations that model the interconnections among variables. These equations are computed using data samples, and the model's adequacy is gauged through diverse statistical techniques. SEM's potency lies in its capacity to concurrently test and estimate multiple associations while accommodating potential variable interdependencies, rendering it invaluable for unraveling complex data interrelations. Its applications encompass hypothesis testing regarding variable relationships and discerning underlying determinants of phenomena. Additionally, SEM's predictive utility permits projections of future events based on inferred model relationships (Kline, 2011).

In the context of the TPB, the SEM will encompass factors deemed to exert influence on the recycling intentions and behaviors of Turkish households.

4. Results and Discussion

4.1. Background and Socio-Demographic Variables

Table 2 presents a comprehensive overview encompassing the background and sociodemographic attributes of the participants involved in this study. The analysis reveals that 48.0% of the research participants are male, while 52.0% are female. A substantial majority of respondents (86.0%) fall within the age bracket of 38 or younger. An overwhelming majority of households (98.5%) boast a high school diploma or an even higher level of educational attainment. Among the interviewed individuals, 63.5% indicated that they are not married, while 34.5% conveyed their marital status as married. The research cohort features a composition where 24.6% are individuals with children and 75.4% are those without children. Notably, the average household size for the participants stands at 3.3 individuals.

In terms of per capita household income, the distribution across households is as follows: 33.7% exhibit a per capita income below $227, 31.3% fall within the range of $226 to $500, and 35.0% surpass the threshold of $501. The survey outcomes further unveil recycling patterns, revealing that 47.7% of households engage in the recycling of glass, 41.4% actively recycle plastics, 53.5% partake in the recycling of paper, cardboard, and other materials, 41.4% contribute to the recycling of fabrics and textiles, and 39.8% demonstrate involvement in the recycling of batteries and electronic equipment..

Table 2. Background and Socio-Demographic Variables of the Questionnaire

Variables name	Group of variable	Percentage**
Gender	1. group: Woman	52,0 %
	2. group: Men	48,0 %
Age	1. group: 18-28 years	53,5 %
	2. group: 29-38 years	32,5 %
	3. group: 39-48 years	10,1 %
	4. group: 49-58 years	2,9 %
	5. group: 59 + years	1,1 %
Descriptive statistics of age (years) Min= 18,0 Max=65,0 Mean= 28,8 Sd=9,2		
Education	1. group: Low (5-8 years)	1,5 %
	2. group: Middle (9-12 years)	26,2 %
	3. group: High (13 + years)	72,3 %
Marriage status	1. group: Married	34,5 %
	2. Not married	65,5 %
Have children	1. group: having a child	24,6 %
	2. group: not having a child	75,4 %
Number of households	1. group: 1-2 person	30,1 %
	2. group: 3-4 person	53,5 %
	3. group: 5 and + person	16,4 %
Descriptive statistics number of households (person) Min=1,0 Max=9,0 Mean=3,3 Sd=1,4		
Per capita household income	1. group: 225 $ * or less	33,7 %
		31,3 %

(average per three people)	2. group: 226-500 $ * 3. group: 501 $* or more	35,0 %
Recycling status for glass materials	1. group: Yes	47,7 %
	2. group: Occasional	27,5 %
	3. group: No	24,8 %
Recycling status for plastics	1. group: Yes	41,4 %
	2. group: Occasional	32,3 %
	3. group: No	26,3 %
Recycling status for paper, cardboard and other materials	1. group: Yes	53,5 %
	2. group: Occasional	29,2 %
	3. group: No	17,3 %
Recycling status for fabrics and textiles	1. group: Yes	41,4 %
	2. group: Occasional	27,5 %
	3. group: No	31,1 %
Recycling status for batteries and electronics	1. group: Yes	39,8 %
	2. group: Occasional	28,9 %
	3. group: No	31,3 %

* 1 $ = Average 8.87 Turkish Liras in 2021 (CBRT, 2022). ** All percentage estimates in groups equal 100%.

4.2. Results of Reliability and Confirmatory Factor Analysis

Cronbach's Alpha coefficient was employed to gauge the reliability, and its resultant value of 0.81 underscores the high reliability of each of the 25 5-Point Likert items ($p = 0.000$).

Confirmatory Factor Analysis (CFA) serves as a pivotal method for evaluating the acceptance or rejection of measurement theories (Brown & Moore, 2012). Within this study, CFA was deployed to scrutinize both the validity and reliability of the measurement scales. Specifically, CFA was harnessed to scrutinize the seven primary latent variables encompassing a total of 25 observed items. The initial evaluation of the CFAs was conducted via the goodness-of-fit index. Table 3 elucidates the benchmarks for both the initial and subsequently adjusted CFAs. Consequently, the initial CFA outcomes led to an iterative refinement, culminating in the generation of modified CFA values. While prior investigations have advocated for a $\chi 2/df$ threshold capped at 3 (Scappini & Fioravanti, 2022), others have stipulated a maximum threshold of 4.5 (Mahmud & Osman, 2010). Employing Equation 1, the initial CFA yields a value of 3.8 (1).

$$\text{Chi-sq.}\ (\chi 2) / df = 969{,}2 / 254 = 3{,}8 \quad (1)$$

As indicated by the CFA results, all observed variables exhibit t-values exceeding 2, underscoring the statistical significance of each facet under investigation. Nonetheless, the comprehensive model's efficacy can be further enhanced. Consequently, the CFA output file was meticulously examined to discern potential amendments among variables. In light of addressing potential multicollinearity among variables, recommendations for modifications were proposed. Despite the reliability of the items and scales employed in this study, the presence of correlated responses due to the inherent similarity of several questions introduced multicollinearity concerns (Mahmud & Osman, 2010; Bortoleto et al., 2012; White & Hyde, 2012; Chan & Bishop, 2013; Botetzagias et al., 2015).

Table 3. The Goodness of Fit Indices Results in CFA and Modified CFA

The Goodness of Fit Index	CFA	Modified CFA	The Goodness of Fit Criterion
NFI	0,96	0,96	$0{,}95 \leq NFI \leq 1{,}00$ Perfect Fit
NNFI	0,96	0,96	$0{,}97 \leq NFI \leq 1{,}00$ Perfect Fit
CFI	0,97	0,97	$0{,}97 \leq NFI \leq 1{,}00$ Perfect Fit
IFI	0,97	0,97	$0{,}97 \leq NFI \leq 1{,}00$ Perfect Fit
RMSEA	0,082	0,79	$0.05 \leq RMSEA \leq 0.08$ Acceptable Fit

NFI=Normed Fit Index, NNFI= Non-Normed Fit Index, CFI= Comparative Fit Index, IFI=Incremental Fit Index, GFI= Goodness of Fit Index, RMR = Root Mean Square Residual, RMSEA= Root Mean Square Error of Approximation. Reference: (Barrett, 2007).

The forthcoming suggestions pertain to the adjustments in the output file driven by CFA insights: A strategic adjustment in the RB4-RB5 variables would contribute to a 36.7-unit increment in the chi-square statistic, a 24.6-unit rise in the A1-A2 chi-square statistic, and a 15.0-unit augmentation in the PBC2-PBC3 chi-square statistic. The resultant corrected value of $\chi 2/df$ is depicted in Equation (2). Comparative assessment of the goodness-of-fit indices for CFA and modified CFA is elucidated in Table 3, illustrating noteworthy improvements across all indices post-adjustment.

$$\text{Chi-square}\ (\chi 2) / df = 902.12 / 251 = 3.6 \quad (2)$$

Table 4 presents comprehensive item insights drawn from prior research endeavors. It encompasses each item's mean score on the 5-Point Likert Scale (ranging from 5 = strongly agree to 1 = strongly disagree), alongside the t-values, R2 values, and factor loadings for all observed variables integrated within the path analysis following modifications. The outcomes stemming from the CFA analysis manifest t-values surpassing the 2-threshold and R2 values frequently exceeding 0.67 (with the exception of a singular variable). This collective inference underscores the statistical significance inherent in each component.

Table 4. Results of Confirmatory Factor Analyses (Modified)

Items (25 items)	Mean score of 5-point Likert scale	Factor Loads	T-values	R^2
Recycling Behaviours				
RB1- I recycled my recyclables regularly[a]	3,78	0,9	22,96	0,8
RB2- I have demonstrated recycling behavior in the last four weeks[a]	3,73	0,87	21,95	0,76
RB3- I donate my old clothes and shoes to charity or give them to those in need. [b]	4,39	0,47	9,82	0,42
RB4- When I do not use glass, plastic, and paper waste, I sort it out and throw it in the recycling garbage can.	3,82	0,83	20,11	0,68
RB5- I sort and throw electronic waste and batteries into the recycling garbage can	3,73	0,65	14,28	0,42
Intentions				
I1- I plan to recycle my recyclables in the next four weeks. [c]	4,25	0,86	21	0,73
I2- I will recycle my recyclables every time I have them for disposal. [c]	4,17	0,85	20,71	0,72
I3- I am willing to participate in the recycling system in the future. [c]	4,3	0,69	15,36	0,47
Attitudes toward recycling behaviors				
A1- Recycling is useful. [c]	4,89	0,88	22,76	0,78
A2- Recycling is good [d]	4,9	0,93	24,79	0,86
A3- Recycling is necessary [d]	4,78	0,9	23,81	0,82
A4- Recycling is right [d]	4,87	0,94	25,43	0,88
A5- Recycling is valuable [d]	4,85	0,91	23,93	0,82
Subjective Norms (SN)				
SN1- I feel responsible for recycling. [e]	4,27	0,86	21,24	0,73
SN2- People I care about expect me to recycle. [d f]	4,38	0,86	21,49	0,74
SN3- I would feel guilty if I did not recycle my waste. [g f]	4,18	0,87	21,94	0,76
Perceived Behavioural Control				
PBC1- I would find it difficult to recycle the recyclable materials (paper, glass, plastic, etc.) regularly in the next few months [d]	2,86	0,91	22,49	0,83
PBC2- The number of outside influences that might prevent me from regularly recycling the recyclables (paper, glass, plastic, etc.) in the next few months [e]	2,81	0,82	18,97	0,67
PBC3- I have complete control over recycling the recyclables (paper, glass, plastic, etc.) regularly in the next few months. [e]	2,87	0,83	19,29	0,68
Awareness of Consequences				
AC1- Recycling conserves natural resources. [g e h f]	4,87	0,88	22,43	0,77
AC2- Recycling reduces the amount of waste that ends up in landfills [g h f]	4,85	0,84	20,89	0,71
AC3- Recycling saves energy. [c g]	4,79	0,91	23,67	0,83
Concern				
C1- I do not care about the negative environmental impact of not recycling.	1,38	0,94	25,17	0,88
C2- I do not care about the social impact of not recycling.	1,41	0,93	24,68	0,86
C3- I do not care about the economic costs of not recycling.	1,49	0,92	24,43	0,85

Fit Indices of Path Analysis (CFA): RMSEA= 0.079, p=0,000, Chi-square=902,17, df=251, x2/df=3,6, NFI=0,96, NNFI= 0,96, CFI=0,97, IFI=0,97. References: [a] Wan et al., 2012, [b] Yılmaz et al., 2010, [c] Wan et al., 2017, [d] Oztekin et al., 2017, [e] Bezzina and Dimech, 2011, [f] Arli et al., 2019, [g] Tonglet et al., 2004b, [h] Ramayah et al., 2012

The covariance matrix depicting the interrelationships among the latent variables is illustrated in Table 5. Remarkably, all covariance matrix p-values demonstrate statistical significance at the 5% level. The cross-correlations observed between latent variables intensify as their proximity to 1 increases. This analysis unequivocally reveals the inherent strength characterizing the associations among all latent variables. Furthermore, the signs preceding each coefficient (whether positive or negative) furnish vital insights regarding the directional correlations governing these relationships.

Table 5. The Covariance Matrix of the Variables for the Modified Path Analysis

	Concern	Awareness of Consequences	Subjective Norm	Attitudes	PBC	Intentions
Concern	-					
Awareness of Consequences	-0.44 (0.04*) -10.09	-				
Subjective Norm	-0.41 (0.04*) -9.17	0.44 (0.04*) 9.94	-			
Attitudes	-0.66 (0.03*) -21.56	0.89 (0.01**) 63.50	0.65 (0.03*) 20.15	-		
PBC	0.43 (0.04*) 9.53	-0.15 (0.05*) -2.79	-0.38 (0.05*) -7.95	-0.18 (0.05*) -3.45	-	

*p<0.05, **p<0.1

4.3. Results of Structural Equation Modeling

Within the realm of the Theory of Planned Behavior (TPB), Structural Equation Modeling (SEM) was deployed to meticulously probe the recycling behaviors exhibited by Turkish households. The framework entailed endogenous latent factors encompassing attitudes, subjective norms (SN), perceived behavioral control (PBC), awareness of consequences (AC), and concern. Simultaneously, exogenous latent variables encapsulated recycling-related behaviors and intentions. It is postulated that attitudes, SN, PBC, AC, concern, recycling-related behavior, and intention all interplay to exert influence. Through this conceptual framework, intricate interrelationships are established, wherein the t-values and normalized solutions between variables assume pivotal significance within both the initial SEM and the preliminary path analysis. Analogously, the SEM's fit index stands to benefit from modifications aimed at enhancement.

Table 6 furnishes a comprehensive depiction of the SEM outcomes, with the initial SEM bearing a Root Mean Square Error of Approximation (RMSEA) of 0.084, a chi-square of 1014.34, degrees of freedom (df) at 258, and a $\chi 2$/df ratio of 3.94. Comparatively, the modified SEM delivers an improved fit, characterized by an RMSEA of 0.080, a chi-square of 357.5, df at 92, and a $\chi 2$/df ratio of 3.8. These indices collectively provide a robust assessment of the SEM's alignment with the underlying data and theoretical framework.

To optimize the chi-square value in the output file, the following adjustments are recommended: refinements involving the RB4-RB5 variables led to a substantial 31.3 unit enhancement in chi-square, the A1-A2 correction improved by 25.8 units, and the PBC2-PBC3 modification yielded an 11.8 unit enhancement. With these adjustments, the modified model achieved values of RMSEA = 0.080, chi-square = 357.5, df = 92, and $\chi 2$/df = 3.8. This revised model emerges as a more fitting and acceptable representation within the established fit range.

Table 6. The Goodness of fit Results in SEM and Modified SEM

Fit Index	SEM	Modified SEM	The Goodness of fit criterion
NFI	0,96	0,96	0,95 ≤ NFI ≤ 1,00 Perfect Fit
NNFI	0,96	0,96	0,97 ≤ NFI ≤ 1,00 Perfect Fit
CFI	0,97	0,97	0,97 ≤ NFI ≤ 1,00 Perfect Fit
IFI	0,97	0,97	0,97 ≤ NFI ≤ 1,00 Perfect Fit
RMSEA	0,084	0,080	0.05 ≤ RMSEA ≤ 0.08 Acceptable Fit

NFI=Normed Fit Index, NNFI= Non-Normed Fit Index, CFI= Comparative Fit Index, IFI=Incremental Fit Index, GFI= Goodness of Fit Index, RMR = Root Mean Square Residual, RMSEA= Root Mean Square Error of Approximation. Reference: (Barrett, 2007).

The resultant structural equation (Equation 3) is delineated as follows: Behavior = (0.72 × Intention) – (0.19 × PBC), R_2 = 0.69 (3)

In this structural equation, the initial part describes the interplay between the exogenous latent variables PBC and intention, in addition to the assumption that the endogenous variable PBC influences behavior. This component of the model explains 69% of behavior. Interestingly, while the intention variable demonstrated a positive impact on behavior, the PBC variable exhibited a negative coefficient within the SEM.

Intention = (–0,55 × PBC) + (0,34 × SN) + (0,54 × C) – (0,71 × AC) + (1,16 × A), R2 = 0.76 (4)

The second portion of the SEM unveils the equation for intention (Equation 4), detailing the relationships and signs of latent variables—attitudes, SN, AC, concern, and PBC—that contribute to the explanation of intention. An impressive 76% of the intent variable's variance is accounted for by these variables (R_2 = 0.76). Notably, the sign of the PBC variable—a counterpart to the intention variable—has

been inverted from positive to negative. SN, attitudes, and concern positively influence intentions, whereas PBC and AC exert negative effects on intentions.

Behavior = (–0,59 × PBC) + (0,24 × SN) + (0,38 × C) – (0,51 × AC) + (0,83 × A), R_2 = 0,57 (5)

Furthermore, the third section of the SEM—captured in Equation 5—illuminates the interdependencies among latent variables, offering insights into how they shape behavior. This segment explains 57% of behavior (R_2 = 0.57). The mathematical formulations of these structural equations (3)-(5) are visually depicted in Figure 3, encapsulating the recycling practices of Turkish households.

Upon analysis, the mathematical and graphical results of the model reveal the following insights:

The link between Turkish recycling behavior and intentions is statistically significant (t = 13.45, standard deviation = 0.70), signifying that recycling-related intentions translate into behavior.

The latent variables of attitudes, SN, AC, concern, and PBC all wield influence on the recycling-related intentions of Turkish households. Notably, PBC emerges as a significant latent predictor for recycling behavior.

PBC exhibits a robust negative connection with the recycling behaviors of Turkish households (t = -4.13, standard deviation = -0.19), underscoring its pivotal role as a latent predictor for recycling behavior.

Recycling intentions of Turkish households are positively influenced by attitudes, SN, and concern. These latent variables play crucial roles in shaping recycling intentions.

The inverse structure of concern-related observed items (C1, C2, and C3) on a 5-point Likert scale—aligned closely with "strongly disagree" (1)—implies a negative influence. Despite this, the latent variables of concern significantly impact recycling intentions in a favorable manner.

Both PBC and AC exert negative impacts on the recycling intentions of Turkish households.

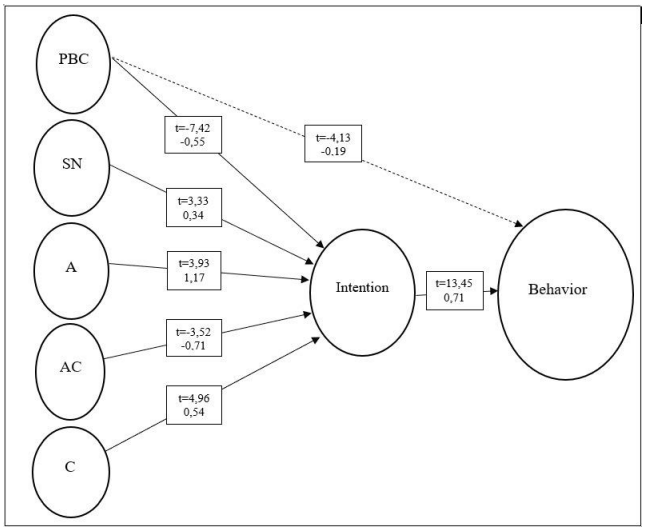

Figure 3. Structural Equation Model of Turkish Households' Recycling Behavior. Fit indices of SEM: RMSEA=0,08, Chi-square=951,17, p=0,000, df=255, x2/df=3,7, NFI=0,96, CFI=0,97, GFI=0,85

In summary, through an intricate interplay of latent variables and their complex relationships, this study's structural equation model provides an in-depth understanding of Turkish households' recycling behaviors and intentions.

Table 7 presents the covariance matrix for structural equation methods, illuminating the correlations and signs between the latent variables within the structural model.

To the best of our knowledge, no national research focusing on household recycling behavior within the context of TPB has been undertaken in Türkiye. However, two pertinent studies, conducted in distinct countries, offer valuable insights that facilitate a rapid comparison of findings (Wan et al. 2012; Strydom 2018). The outcomes of hypothesis testing in the present study are presented in Table 8.

Table 7. Covariance Matrix of the Latent Variables in the Structural Equation Method

	Intentions	Behaviors	PBC	SN	C	AC	A
Intentions	1,00						
Behaviors	0.81	1,00					
PBC	-0.55	-0.59	1,00				
SN	0.77	0.62	-0.38	1,00			
C	-0.28	-0.28	0.41	-0.41	1,00		

Strydom (2018) applied the TPB model to a sample of 2004 South African households, encompassing both intention and behavior variables. In this study, attitudes and subjective norms emerged as significant predictors of intention according to the TPB model. Conversely, perceived behavioral control (PBC) did not appear to influence the recycling intentions of South African participants. When evaluating the fit of the TPB model employed in the research, the Root Mean Square Error of Approximation (RMSEA) yielded an acceptable fit with an observed value of 0.113.

Table 8. Hypothesis Results and Comparison with Similar Studies

Hypothesis	Present Study (Türkiye)	South Africa (Strydom, 2018)	Hong Kong (Wan et al., 2012)
H_1. Households' intention towards recycling has an effect on their recycling behavior.	Accepted	Accepted	Accepted
H_2. Households' attitudes towards recycling have an effect on their recycling intentions.	Accepted	Accepted	Accepted
H_3. Households' subjective norms towards recycling have an effect on their recycling intentions.	Accepted	Accepted	Accepted
H_4. Households' PBC towards recycling has an effect on their recycling intentions.	Accepted	Rejected	Accepted
H_5. Households' PBC towards recycling has an effect on their recycling behavior.	Accepted	Accepted	-
H_6. Households' awareness of consequences towards recycling has an effect on their recycling intentions.	Accepted	-	Accepted
H_7. Households' concern towards recycling has an effect on their recycling intentions.	Accepted	-	Accepted

Wan et al. (2012) employed the TPB to model factors influencing the recycling behavior of 205 households in Hong Kong. Their model encompassed both intention and behavior variables. According to the TPB model, attitudes, subjective norms (SN), perceived behavioral control (PBC), awareness of consequences (AC), and concern were identified as significant predictors of intention.

In summation, it is evident that household recycling behavior in Türkiye, South Africa, and Hong Kong is influenced by household intentions. The recycling attitudes of households in these three countries significantly impact their recycling behaviors. Additionally, household intentions in Türkiye, South Africa, and Hong Kong are influenced by subjective norms related to recycling behavior. While PBC affects household intentions in Türkiye and Hong Kong, this relationship is not observed in South Africa. Furthermore, PBC impacts recycling practices in Türkiye and South Africa. Finally, the intentions of households in Türkiye and Hong Kong are influenced by awareness of consequences (AC) and concerns.

5. Strength, Weakness and Limitation of The Research

The paramount significance of this research lies in its comprehensive modeling of recycling intentions and behaviors among Turkish households at the national level. Consequently, this study offers a pivotal resource for national and municipal authorities, recycling experts, and future scholarly investigations. It is crucial to underscore the scientific contributions engendered by this endeavor, although certain methodological refinements can be considered.

An integral aspect pertains to methodological enhancements. Although the employment of an online questionnaire allowed for broader participant engagement and national reach, further methodological rigor could be achieved through face-to-face surveys to mitigate potential biases associated with the relatively higher education levels of online respondents. Moreover, shifting towards a 7 or 9-point Likert Scale, in lieu of the current 5-point scale, could potentially bolster model fit values.

While the current study's model fit is deemed acceptable within its scope, future research endeavors could strive for improved fit indices. Notably, the modified model, although having reduced the RMSEA value below 0.08, might benefit from further refinement to achieve an even better fit. In the context of path analysis and structural equation models, a $\chi 2/df$ value below or equal to 3 is considered ideal, which can be a pursuit for subsequent investigations.

Considering that this is the inaugural TPB-related study encompassing Türkiye in its entirety, it serves as a foundational platform for comparative analysis with findings from global counterparts. For forthcoming research, it is advisable to undertake household surveys across each province, facilitating a more nuanced understanding of recycling behaviors and intentions within diverse regional contexts. This approach could enrich the existing knowledge base and inform targeted interventions at a local level.

6. Conclusion

This study investigated the recycling behaviors and intentions of Turkish households within the framework of the Theory of Planned Behavior (TPB). Through a quantitative methodology, we gained valuable insights into the factors shaping recycling behaviors and the interplay between intentions and actions. The findings shed light on the nuanced dynamics that influence recycling practices at the household level in Türkiye.

Our analysis revealed that recycling intentions serve as a strong predictor of actual recycling behaviors among Turkish households. The TPB model demonstrated that multiple factors contribute to the formation of recycling

intentions. Perceived behavioral control (PBC), subjective norms (SN), awareness of consequences (AC), and concern collectively contribute to shaping households' intentions to engage in recycling activities. These intentions, in turn, drive the observed recycling behaviors.

In the context of the United Nations' Sustainable Development Goals, this study aligns with the goal of responsible production and consumption. The household emerges as a critical locus of action in promoting sustainable behaviors. As such, our research suggests that targeted efforts should be directed towards fostering positive recycling attitudes, enhancing recycling-related awareness, and facilitating easy access to recycling facilities.

Building upon the insights garnered from this study, several avenues for future research and practical interventions are evident. The study highlights the need to bolster recycling infrastructure across Türkiye. Increased access to recycling bins, particularly for battery and electronic waste, is essential to encourage recycling behaviors. Policymakers should strategically position recycling bins to maximize convenience for households. Comprehensive public awareness campaigns can play a pivotal role in shaping recycling behaviors. Leveraging various communication channels, including weather bulletins and news broadcasts, can effectively disseminate information and underscore the benefits of recycling. Collaborative efforts between educational institutions, local governments, and community organizations can foster a culture of recycling from an early age. Workshops, seminars, and awareness programs can empower individuals to become active participants in sustainable waste management practices. Employing behavioral economics principles, small nudges and incentives can encourage households to overcome inertia and engage in recycling activities. Tailored messages and rewards may effectively bridge the intention-behavior gap. To enhance the accuracy of future research, a combination of online and face-to-face surveys could provide a more representative sample of the population. Employing a broader Likert scale, such as 7 or 9 points, may yield greater sensitivity in gauging responses. Further research could explore cross-cultural variations in recycling behaviors using the TPB framework. Comparative studies across different countries can reveal insights into cultural influences on recycling intentions and behaviors.

In conclusion, this study advances our understanding of the recycling behaviors and intentions of Turkish households and their alignment with the Theory of Planned Behavior. The findings underscore the significance of intention in driving recycling behaviors and highlight the complex interplay of psychological and contextual factors. By implementing the suggestions outlined above, stakeholders can contribute to the realization of sustainable waste management practices and support Türkiye's commitment to responsible consumption and production.

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RESP

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Women's Employment in Line with Sustainable Development Goals: The Example of Azerbaijan

Sürdürülebilir Kalkınma Hedefleri Doğrultusunda Kadın İstihdamı: Azerbaycan Örneği

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ANAHTAR KELİMELER

Sürdürülebilir Kalkınma Hedefleri
Kadın İstihdamı
Azerbaycan

ÖZ

Bu çalışmanın amacı Azerbaycan'da kadınların istihdam düzeyinin mevcut durumunun Sürdürülebilir Kalkınma Hedefleri (SDGs) kapsamında analiz edilmesidir. Bu doğrultuda kadın istihdamına ilişkin mevcut istatistikler incelenmiş, Azerbaycan'da kadınların istihdama ilişkin karşılaştıkları sorunlar araştırılmıştır. Çalışmada stratejik ve hukuki belgeler, uluslararası kuruluşların raporları/istatistikleri ve Azerbaycan Cumhuriyeti Devlet İstatistik Komitesi (SSCRA) bilgileri kullanılmıştır. İstatistikler ve uluslararası raporlar doğrultusunda, tüm dünyada olduğu gibi Azerbaycan'da da kadınların ücretli aylık ortalama maaşları, erkeklerinkinden daha düşük, kadınların işsizlik oranları fazla, ayrıca kadının işgücündeki payı da erkeklere nazaran geri planda kalmıştır. Azerbaycan, politika belgelerinde kadın haklarına yönelik taahhütlerde bulunmuş, yasal metinlerinde kadınlara yönelik hakları tanımlamış, toplumsal cinsiyet eşitliğine yönelik belirli bir ilerleme kaydetmiştir. Fakat SDG (5-8) hedefleri kapsamında çalışmaların artırılarak sürdürülebilir bir yapıya kavuşturulması gerekmektedir.

KEYWORDS

Sustainable Development Goals
Women's Employment
Azerbaijan

ABSTRACT

The aim of this study is to analyze the current situation of women's employment level in Azerbaijan within the scope of the Sustainable Development Goals (SDGs). In this regard, existing statistics on women's employment were examined and the problems faced by women regarding employment in Azerbaijan were investigated. Strategic and legal documents, reports/statistics of international organizations and information of the State Statistics Committee of the Republic of Azerbaijan (SSCRA) were used in the study. In line with statistics and international reports, in Azerbaijan, as in the rest of the world, women's average monthly salaries are lower than men's, women's unemployment rates are higher, and women's share in the labor force remains behind compared to men. Azerbaijan has made commitments to women's rights in its policy documents, defined rights for women in its legal texts, and certain progress has been made towards gender equality. However, within the scope of SDG (5-8) targets, studies need to be increased and a sustainable structure should be achieved.

1. Introduction

A key component of ensuring social welfare is employment. One of the primary goals of the Sustainable Development Agenda has been identified as ensuring full, productive employment and decent labor. Women must participate fully in the workforce on an equal basis with men to maintain sustainable economic development. In other words, women's engagement in the labor force benefits not only their well-being and the well-being of their families but also the economy. to ensure gender equality, it is crucial to utilize men and women's talents at the same level in the workplace. In the report of the International Labor Organization (ILO), *World Employment and Social Outlook: Trends for Women*; it was emphasized that women spend less time in paid work and more time in unpaid work. Accordingly, women spend

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approximately 2.5 times more time on unpaid housework and family care than men. This situation also reduces women's access to social protection *(*ILO, 2017). Although unemployment is a concern for both men and women, but it affects women more because of the physiological demands of childbearing, social expectations, and domestic responsibilities.

Azerbaijan has a legal framework that ensures gender equality in the field of employment. Azerbaijan has ratified the relevant conventions of the International Labor Organization on the elimination of discrimination against women. Although there has been progress in gender equality since 1991, there are still issues that need to be carefully emphasized within the scope of the SDGs, including eradicating data gaps, ensuring women's representation, eradicating gaps in decision-making positions, and promoting women's employment.

The aim of the study is to analyze the current situation of women's employment in Azerbaijan, to reveal the problems they face in the labor market and to evaluate these issues within the scope of SDGs. Comparative economic-statistical analysis, generalization and systematic analysis methods were used in the research. Accordingly, strategic and legal-normative documents, reports/statistics of international organizations, and SSCRA information were used.

2. SDGs and Women's Employment

Women experience discrimination in the workplace, in politics, in the home, and at society. In this aspect, women perform three times as much unpaid work as men do, although 50% of women over the age of 15 are employed, compared to 75% of men. In the workplace, women are more likely to experience unfavorable conditions, and they get less money for doing the same professions as men. Women's career advancement is significantly impacted by such circumstances. Women are underrepresented in politics and business at the highest levels, and they are also underrepresented among business owners. Given that women make up roughly 50% of the world's population, these unfavorable conditions do not point to a sustainable process. Inclusive growth and development requires the involvement of women and girls in this process (Roy and Xiaoling, 2022: 930-931). By boosting the economy, gender equality advances that goal. The trend of female labor force participation is U-shaped. As a result, even while women's employment involvement initially declines during the process of economic development, it eventually rises in the years that follow. To build this process, the business world, non-governmental organizations (NGOs), and governments need to create an environment where women can access different areas and participate in decision-making processes with an inclusive approach (Mehdiyeva, 2023). According to research, the elimination of gender inequalities (especially in the fields of education and employment) leads to a process that contributes to economic growth and increases the real gross domestic product (GDP) per capita in the long term (Esen ve Şeren, 2022).

SDGs were issued by the United Nations (UN) in 2015 as a universal call for action with goals such as peace, prosperity, and protection of the world. To achieve these goals, the 2030 Sustainable Development Agenda has been determined. The SDGs, often known as the global goals, has 17 targets (see Figure 1). The objectives set forth here are all interconnected. In this situation, a target's results may be impacted by a target's actions. To accomplish its objectives, the SDGs, which were developed with the ideology of eradicating hunger, poverty, AIDS, and discrimination against women and girls, need financial resources, knowledge, and technology (UNDP, 2023).

Ensuring gender equality is not only a fundamental human right, but also an issue that needs to be carefully considered for a sustainable future. However, women are more affected by situations such as climate change, lack of health services, economic crises and violence. Women play a significant role in all 17 of the targets (Figure 1). Additionally, these objectives are crucial to guaranteeing the rights of women and girls, achieving justice, and ensuring sustainability for future generations (UNWomen, 2023a). In this context, the 2030 Sustainable Development Agenda points to the universal consensus of societies on the international platform in ensuring gender equality. Economic empowerment of women is only possible by providing more employment to women and reducing the burden of unpaid care. Steps taken in line with this philosophy lead to the formation of a transformative vision (Ameratunga Kring, 2017: 3).

Despite the fact that all goals contain a component connected to women, SDG 5 can be viewed as the main framework because it is the major goal and specifically addresses the issue. Even if there have been improvements and efforts taken in the direction of women's and girls' empowerment, there are still disparities in areas including the labor market, education, violence, and unpaid care workIn order to prevent these inequalities, SDG 5 has set the following targets (UNDP, 2023):

- Ending all forms of discrimination against women and girls
- Elimination of violence against women in public and private spaces
- Providing equal opportunities for women in decision-making processes
- Increasing the technological knowledge of women
- Creating applicable legislation
- Ensuring universal access to health services
- Ensuring property rights
- Ensuring free care and equality in household obligations

Figure1: SDGs

Previously, the Millennium Development Goals (MDGs) included gender equality and women's empowerment with a focus on education to raise the percentage of girls enrolled in school in developing countries. The 2030 SDG 5 then broadened its focus to include the empowerment of women and girls in recognition of the significance of women's economic independence in attaining gender equality. Accordingly; It is diversified in the dimensions of women's access to employment, safe and decent work environment, financial services, information technology, social security, public policies, and political participation. Countries strive to minimize inequalities to achieve SDGs (Roy and Xiaoling, 2022: 931).

Although there are seven years left until the 2030 Sustainable Development Agenda, 23.1% of SDG 5 indicators are far from the targets, and 61.5% are at medium level. Due to the slow pace of change in many areas, it is anticipated that it will take 286 years to end legal discrimination and 140 years to attain equal representation for women. Comprehensive policy changes, financial commitments, and political leadership are required to overcome the barriers to SDG 5. Furthermore, achieving gender equality ought to be the shared objective of national policies, institutions, and finances (UN, 2023a: 22).

When women's employment is considered within the scope of SDGs, it can be considered as the main framework of SDG 5. But other SDGs cover more specific targets for women's employment. In this context, the connection between SDGs and women's employment can be observed as follows (UNStats, 2023a):

- *SDG 8: Decent Work and Economic Growth*
- *SDG 8.5: Ensuring full and productive employment, decent work and equal pay for work of equal value for all women and men*
- *SDG 8.8: Protecting labor rights and promoting safe working environments for all workers, including female migrants and those in precarious employment*
- *SDG 1.3: Implementation of social protection systems for all*
- *SDG 10.4: Equity in fiscal, wage, and social protection policies*
- *SDG10.3: Eliminate discriminatory laws, policies, and practices and reduce inequalities*

It is aimed to ensure full and productive employment of all women and men, equal pay for equal work, and decent work by 2030. In particular, to achieve inclusive growth, men and women must be given decent jobs equally. But today, women's participation in the workforce is low and they are more likely to accept insecure and low-paid jobs in the workforce. This situation also poses an obstacle to inclusive growth (UnWomen, 2023d). Globally, 63 percent of women in the 25-54 age group and 94 percent of men in the same age group are in the workforce. This rate dropped to 37 percent in Central and South Asia. It is estimated that the 23 percent gender gap in the world will not close until 2086 in view of current advancements (UnWomen, 2023dAfter the Covid-19 pandemic, the global unemployment rate decreased from 6.6 percent in 2020 to 5.4 percent in 2022. This rate remains below the pre-pandemic level (5.5 percent). According to projections, although it is predicted that the labor market will recover stronger than expected in high-income countries, the same positive picture is not foreseen for low-income countries. The pandemic has especially negatively affected women and young people in the labor market (UN, 2023a:29).

Globally, women's equal participation in the economy has not yet been fully realized. In 2022, 61.4 percent of women of working age (25-64 years old) globally will be in the workforce, while this rate for men is 90.6 percent. In 2019, women's share in total labor income was 34 percent. On the basis of workforce inequalities between genders; There are factors such as occupational discrimination, women's household care obligations, women's greater likelihood of working part-time jobs and taking a break from their careers. This situation causes inequalities to deepen even further. In order to prevent the problem; paid parental leave, increased inspections to support wage transparency, paid paternity leave, and child care should be accessible and appropriate (UNStats, 2023b: 18).

3. Literature Review

There is a developed literature in the context of women's employment. Accordingly, the issue of women's employment has been discussed in countries at various development levels and solutions have been suggested by examining the inequalities in women's employment. Diallo et al (2023) investigated the impact of non-agricultural diversification strategies by gender in Senegal. The study drew attention to the increase in the role of women in non-agricultural sectors and found that non-agricultural diversification increased the welfare of women living in rural areas. Gadi (2022) examined women's employment in

the field of digital technology in Saudi Arabia. In the study, where a qualitative research technique was used, it was concluded that equal opportunities should be provided for women to find job opportunities in the field of digital technology. Adeosun & Owolabi (2021) examined the reasons for gender inequalities in their study on Nigeria. According to the findings of the study; gender inequalities are more common in some employment sectors, and women with higher education earn higher wagesJayachandran (2021) examined the barriers to women's participation in the labor market in developing countries. Accordingly, existing gender norms are one of the factors that prevent women from participating in the labor market. It is necessary to implement policies designed according to social norms, to ensure gender equality through government policies, and to reconsider and change the norms regarding women's household responsibilities. Nisak & Sugiharti (2020) examined women's poverty in their study specifically in Indonesia. According to the study, women's unequal position in the labor market and education affects women's poverty. Arib (2020) examined the factors that hinder the employment of educated women in Afghanistan. Survey method was used in the study. According to the study findings, the biggest obstacle to the employment of educated women is personal social factors. In addition, the number of income earners in the family and faulty government policies are other obstacles to the employment of educated women. Sarkar, Sahoo & Klasen (2019) investigated female employment transitions for India. According to the study, which examines the reasons for women's employment and leaving their jobs, the increase in the income of household members has an impact on women's entry and exit from work. As a result of cultural and economic factors as well as religious factors, women's labor force participation remains low in India.

Recently, there are also studies in the literature addressing the situation of women's employment in the post-Covid-19 period. Uddin (2021) investigated the difficulties and supporting factors experienced by working women in Bangladesh. Qualitative research method was used in the study. Accordingly, factors such as family support, institutional support and flexibility during Covid-19 facilitate women's work-life balance. Factors such as gender norms, social norms and lack of time are the difficulties women face in their business lives. Landivar et al (2020) examined the effects of Covid-19 on unemployment, labor force, and working hours in gender discrimination in the USA. Accordingly, women's employment has been more affected than men's under Covid-19 conditions. During the pandemic, mothers have reduced their working hours and are more likely to be unemployed than fathers. According to the study findings, Covid-19 has deepened gender inequalities and had negative effects on women's employment. Alon et al (2022) found that during the pandemic, women spent more time due to household responsibilities and their productivity decreased more than men.

There are studies on women's employment in Azerbaijan, which is the country sample of this study. Abdi et al (2023) examined the factors affecting the optimal employment of women in rural handicrafts in the West Azerbaijan province. Survey method was used in the study. It has been found that organizational, individual and cultural factors affect optimal women's employment in rural handicrafts. Jabbarova, & Dunyamaliyeva (2021) analyzed statistical data in the context of employment and gender in Azerbaijan. According to the study findings, women generally work in unpaid work such as domestic care and do not have the same opportunities as men in employment. Additionally, women start their working lives later but retire earlier. Aliyev et al (2020) found an inverted U relationship between married men's income and female employment probability in Azerbaijan. Accordingly, governments should raise public awareness of women's employment through communication tools. Heyat (2020) examined the entrepreneurial activities of Azeri women. According to the study, women's close relationships with home life make it easier for them to participate in informal trade. In addition, the lack of development of the insurance sector is an obstacle to the development of small and medium-sized enterprises. Torrens (2019) examined the cultural factors that enable unmarried women to participate in the workforce, specifically in Turkish cultures. According to the study findings, there is a negative relationship between married women's labor force participation and conservatism in Azerbaijan.

There are also studies in the literature examining women's employment within the scope of SDG. Osundina (2020) examined the effects of positive developments in health and education on women's employment in Nigeria between 1990-2016. According to the study findings, women's education level and health status positively affect the labor force participation rate. Peña-Sánchez et al (2020) conducted a study on SDG (Goal 8 and 5) in EU-28 countries in the period 2009-2018. According to the study findings, the values of EU-28 countries are good within the scope of SDG (Goal 8 and 5). However, the gender wage gap needs to be reduced. Castro Núñez, Bandeira, & Santero-Sánchez (2020) pointed out the importance of social economy organizations in the success of SDG (Goal 5,8,10) in their study for the 2008-2017 period in Spain. It has also been found that women's participation in employment will lead to a low glass ceiling phenomenon and stable jobs.

4. Evaluation of Women's Employment in Azerbaijan within the Scope of SDGs

4.1. Women and SDGs in Azerbaijan

From a historical perspective, Azerbaijan was the first in the East to give women the right to vote in 1918. In addition to this development, which can be seen as an important step towards ensuring gender equality, the protection of women's rights in Azerbaijan is seen as an integral part of the state policy, and national legislation is developed within this

scope. In this context, regulations for women have been made in many laws and decrees, participation in international organizations has been achieved, and contracts and protocols have been signed. Some steps taken towards women's rights can be listed as follows (State Committee for Family, Women and Children Affairs of the Republic of Azerbaijan, 2023):

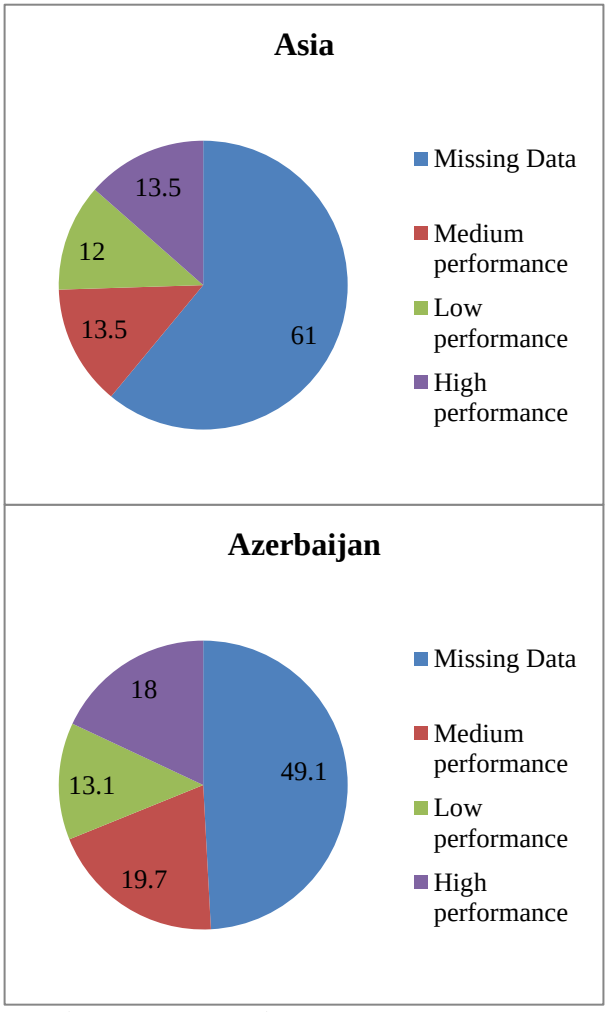
- Becoming a party to the UN Convention on the Elimination of All Forms of Discrimination against Women (1995)
- (ILO) Approval of the Law on Women's Labor in Underground Works and Equal Rights of Men and Women in Equal Work
- Adoption of the Beijing Declaration and Platform for Action (1995)
- Signing of the Decree on Increasing the Role of Women in Azerbaijan (1998)
- Establishment of the State Committee on Women's Issues
- Organizing women's congresses every five years (since 1998)
- Signing of the Decree on the Implementation of the State Women's Policy in the Republic (2000)

In Azerbaijan, measures are taken to ensure the equal participation of women and men in both public and social life. Accordingly, special budget allocations have been provided for the integration of gender equality into state programs and services. Studies are carried out to include more girls, especially in science, engineering, mathematics and technology fields. Azerbaijan is committed to the implementation of international conventions on women's rights, as well as legal regulations on accessible child care and flexible working (UnWomen, 2023b). Although progress has been made in Azerbaijan towards women's rights on a global scale, efforts must continue to ensure gender equality. According to this (UnWomen, 2023c):

- 18.2 percent of seats in parliament belong to women (2021)
- 5.2 percent of women (15-49 years old) have been exposed to physical/sexual violence
- While men spend 8.9 percent of their time on household chores, this rate is 25.4 percent for women
- Women aged 15-49 face barriers to reproductive and sexual health

In Azerbaijan, 50.8 percent of the indicators required to monitor gender targets from the SDG perspective are available as of December 2020. There are gaps in key labor market indicators such as wage inequality between genders, and there are no methodologies that will allow comparable and regular monitoring of other data. These data; It consists of issues such as poverty, access to assets, environment, and harassment, broken down by gender. In this context, it is very important for Azerbaijan to eliminate its deficiencies with gender data to monitor the SDGs on a gender basis (Un Women, 2023c).

Graph 1: Gender Data Gaps Azerbaijan and Region (Asia) Score



Source: (UnWomen, 2023c)

In order to identify data deficiencies for member states, the UN sets a benchmark using 73 gender-specific SDG indicators in 193 member UN states. Accordingly, it evaluates countries according to their performance in terms of data by calculating the 33rd and 66th percentiles according to indicator distributions. Performances are divided into three categories: high, medium and low performance. In this regard, Graph 1 shows the gender data gap in Azerbaijan and the Asian region. Accordingly, 49.1% of the gender data required to monitor the SDGs is missing in Azerbaijan. The same rate is much higher in the region, at 61 percent. This situation, which we can generally interpret as a regional problem, makes it difficult to make an assessment of whether the SDGs have been achieved or not, specifically for the country and region in question. In

addition, availability of data and elimination of gender data gaps will facilitate the detection of gender inequalities and lead to the development of more accurate policy recommendations. It is very important for the public to be informed about public policies in order to monitor how much the SDG has been achieved. The lack of gender-related data makes it difficult to persuade decision makers to make a change. In this context, only 39 percent of the gender data required to monitor the SDGs is generally available (UNWomen, 2021).

Finally, according to the gender inequality index, Eurasia and Central Asia rank fourth in eight regions. Armenia, Moldova and Belarus are among the top countries in terms of recovery, while Tajikistan, Turkey and Azerbaijan are at the bottom. Considering current progress, it is estimated that it will take 167 years to achieve gender equality in the Eurasia and Central Asia region (World Economic Forum, 2023: 6).

4.2. Women's Employment Laws in Azerbaijan

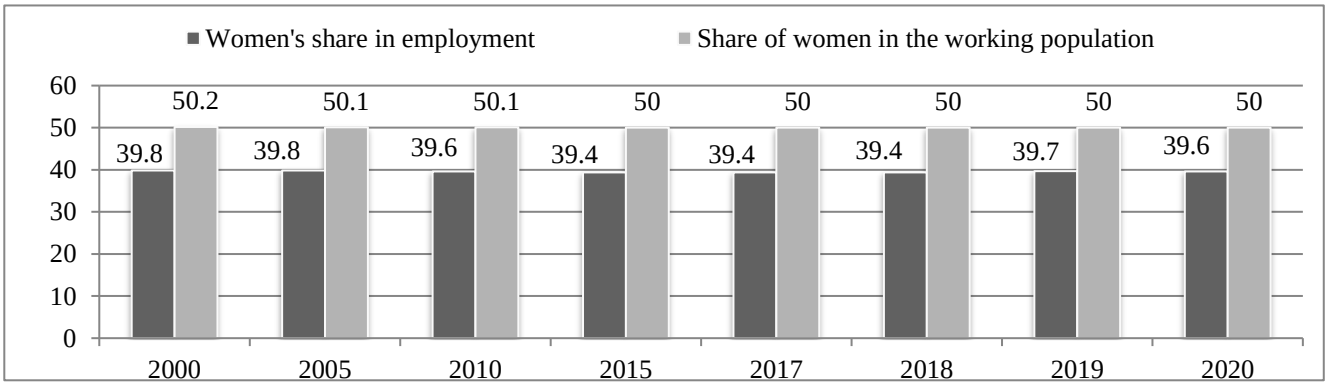
In Azerbaijan, the rights of men and women are officially equal. Women's labor law is regulated by the Labor Code. Women are granted concessions, rights, and additional assurances under the labor law. These benefits include the right to additional holiday for women with babies in their care, reduced working time in connection with pregnancy and baby care, etc. is included. According to the Labor Law, women should have the same opportunities as men when hiring and the same criteria should be applied to them when hiring. It should also be noted that it contains certain restrictions in order to protect women's physiological characteristics and reproductive health. The decree of the President of the Republic of Azerbaijan was signed on March 6, 2000 on the implementation of the state women's policy to ensure legal equality between men and women. The document aims to ensure equal representation of women with men in management positions, taking into account the type of activity in all state institutions, and to ensure equal opportunities for men and women in the work carried out within the framework of economic reforms in the country (E-Kanun, 2000).

According to the "Law on the Guarantee of Gender (Men-Women) Equality" adopted in 2006, entrepreneurs must ensure equality between men and women in working activities, create the same working conditions for workers doing the same job regardless of gender, and create equal opportunities for women and men to engage in entrepreneurial activities. Equal pay must also be ensured (E-Kanun, 2006). In the *Socio-Economic Development Strategy of the Republic of Azerbaijan* (2022-2026), the importance of increasing women's economic activity in society is stated. The document envisages an increase in women's employment in high-income areas, an increase in the ratio of women's average monthly wages to men's monthly average wages by up to 80%, and the dissemination of vocational training, career counseling and other active employment measures for successful activities as the main target indicators (E-Kanun, 2023).

4.3. Women's Participation in the Labor Market

According to research conducted by organizations such as the ILO and the Organization for Economic Co-operation and Development (OECD), women's employment remains low compared to men around the world, women work in worse jobs than men and also receive lower wages. Accordingly, finding a job is becoming a more difficult journey for women, and the situation is not expected to improve anytime soon (ILO, 2023b). According to Graph 2, which shows the share of women in employment and the working age population in the world, women's share in employment did not exceed 40% between 2000 and 2020.

Graph 2. Share of Women in Employment and Working Age Population in the World (2000-2020, %)

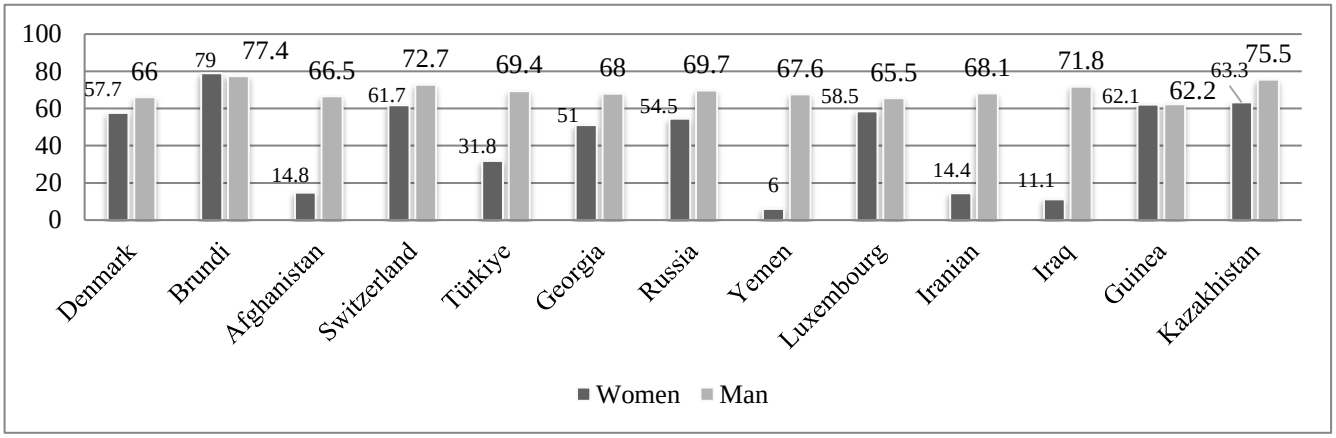


Source: (ILO, 2023a)

The rate of women in employment varies greatly between regions and countries. Low participation of women in the labor market is also related to the country's laws, religious views and stereotypes in society. In Arab countries and North African countries where social norms do not allow women to have paid jobs, the unemployment rate among women is twice as high as that of men. The unemployment rate among women in these regions is over 20%. The

country with the largest gap in the employment of men and women in the world is Iraq (60.7 points), and the country with the smallest gap is Guinea (0.1 points) (Graph 3). In developed countries such as Australia, Switzerland, Denmark and Luxembourg, the difference between the employment of women and men is not large. In countries such as Iran, Yemen, and Afghanistan, women's share in employment is much lower than men in Burindi, located in the east of Africa and one of the poorest countries in the world, women's share of employment exceeds men. The gap between the employment of men and women in Azerbaijan's neighboring countries was 12.2 points in Kazakhstan, 15.2 points in Russia, 17 points in Georgia and 37.6 points in Turkey.

Graph 3: Share of Women and Men in Employment in Selected Countries (2023, %)



Source: (ILO, 2023a).

The most important reason for the low share of women in employment in the world is; providing services such as child care, cleaning at home and cooking is seen as the duty of women. This understanding built by gender norms creates a significant obstacle to women's participation in employment by increasing their household care responsibilities.

4.4. Women's Participation in the Labor Market in Azerbaijan

Women's participation in the labor market has expanded as a result of more employment options for labor resources within the scope of the socioeconomic policy that Azerbaijan has implemented in recent years. Based on statistical data analysis, the proportion of women in the economically active population of the nation increased by 185.7 thousand between 2015 and 2021, from 2404.5 thousand to 2590.2 thousand (Table 1). The proportion of women in the working population rose from 2263.4 thousand to 2408.1 thousand, a change of 144.7 thousand. Women made up 48.8% of the 4988.2 thousand people who were actively residing in the nation in 2021.

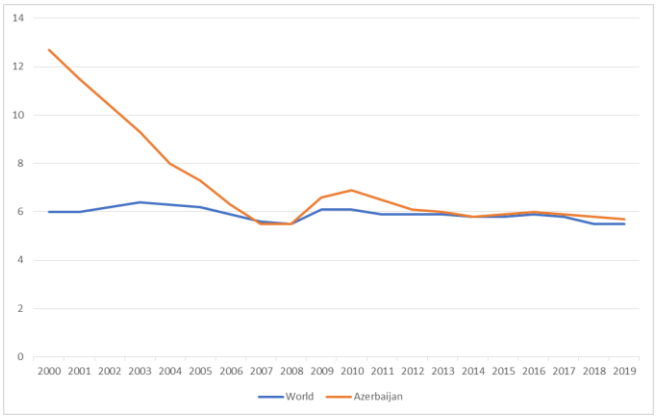
Table 1: Economically Active Population in Azerbaijan (thousand people)

	2015	2018	2019	2020	2021
Number of Economically Active Population - Total	4915,3	5133,1	5190,1	5252,5	5303,9
Woman	2404,5	2495,7	2526,0	2567,5	2590,2
Number of Active Population - Total	4671,6	4879,3	4938,5	4876,6	4988,2
Woman	2263,4	2349,9	2381,7	2351,5	2408,1
Number of Unemployed Population - Total	243,7	253,8	251,6	375,9	315,7
Woman	141,1	145,8	144,3	216,0	182,1

Source: (SSCRA, 2023)

The share of women among the unemployed is high. According to the analysis of statistical data, 57.7% of the unemployed in 2021 were women and 42.3% were men.

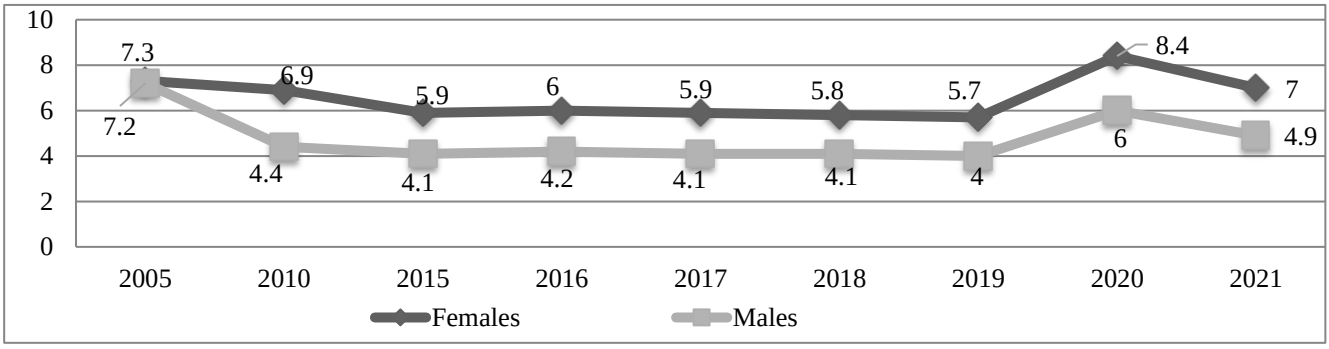
Graph 4: Unemployment rate in the world and Azerbaijan (by sex and age (%), Female)



Source: (UNWomen Data, 2023)

At the same time, although the unemployment rate among women was high, there was a positive development between 2000 and 2007, and the female unemployment rate decreased and reached a point close to the world average (Graph 4). Although there was a decrease in the unemployment level among women between the years 2005 and 2019, there was an increase in 2020. The same result can be said for men. Increased unemployment levels due to the Covid 19 pandemic were higher for women (Graph 5).

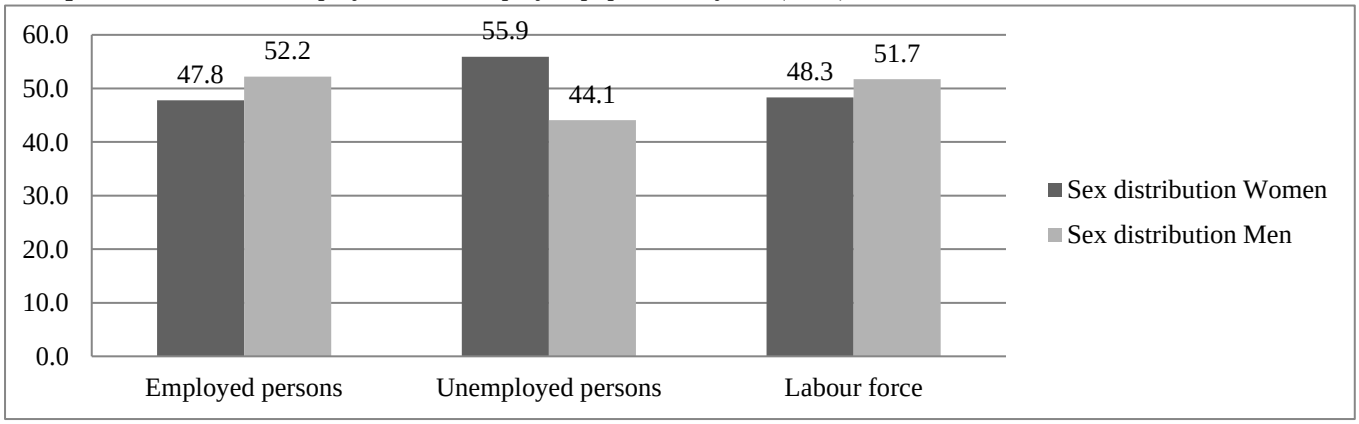
Graph 5. Unemployment Rate in Azerbaijan (2005-2021, %)



Source: (SSCRA, 2023)

Areas where the number of women working for wages is high in the types of economic activities are health and social services; education; rest, entertainment and art. In other words, in 2021, women constituted 78.3% of paid employees in the field of health and social services, 72.7% in the field of education, and 61.2% in the field of recreation, entertainment and arts. In terms of employment, the sectors where male labor is dominant are construction (93%), electricity, gas and steam production (88.8%), mining industry (87.4%), transportation and storage (83.4%). Although there is not a big difference in terms of women's participation in the workforce, men's participation in the workforce is higher than women's (Graph 6).

Graph 6. Distribution of enployed and unemployed population by sex (2022)

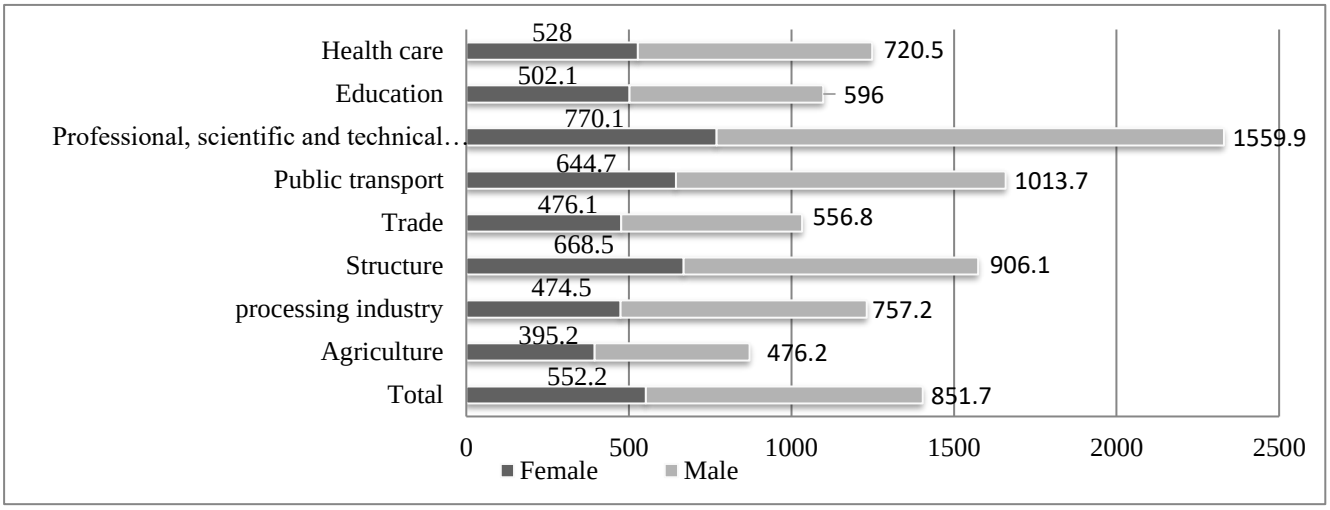


Source: (SSCRA, 2023)

The gender distribution of the employed and unemployed people in 2022 shows that there are more men in the

workforce, more women are unemployed, and more men are employed. In Azerbaijan, women who are paid have a lower average nominal pay per month than men. The average monthly pay for men and women in 2021 was 851.7 manat and 552.2 manat, respectively (Graph 7). The difference between the average nominal monthly pay of men and women is 64.8%. For all forms of economic activity, this is the same situation. The fields of professional, scientific, and technical activity showed the largest variation in the average monthly nominal pay of paid workers among kinds of economic activity. Men in this area make, on average, twice as much money nominally per month as women do. In the domain of professional, scientific, and technological activity, the average nominal monthly wage for women was 770.1 manat, while for men it was 1559.9 manat. The area with the least difference was the commercial area. Women's 476.1 manat and men's 556.8 manat. However, workplace discrimination in Azerbaijan (prohibition of certain job lines for women) contributes to the gender wage gap. For example, female labor force is quite low in electricity, gas and steam production (10.9 percent), transportation and storage (17.2 percent) and construction sectors (7.1 percent), which are the sectors with the highest job restrictions. When looking at average monthly earnings, men earn 46 percent more than women, the highest wage gap in the Europe and Central Asia region (The World Bank, 2021).

Graph 7. Average Monthly Nominal Salary of Salaried Workers by Gender for Some Types of Economic Activities in Azerbaijan (2021, Manat)



Source: (SSCRA, 2023)

According to statistics, there is a pay gap in locations with higher female representation. This demonstrates that women make less money than males. The high percentage of part-time workers among women is one of the causes of their poor income. As of 2021, 60.2% of women were employed part-time (Table 2). Compared to men, this is 20.4 percent more. The group working between 21 and 30 hours per week had the largest percentage of part-time employment.

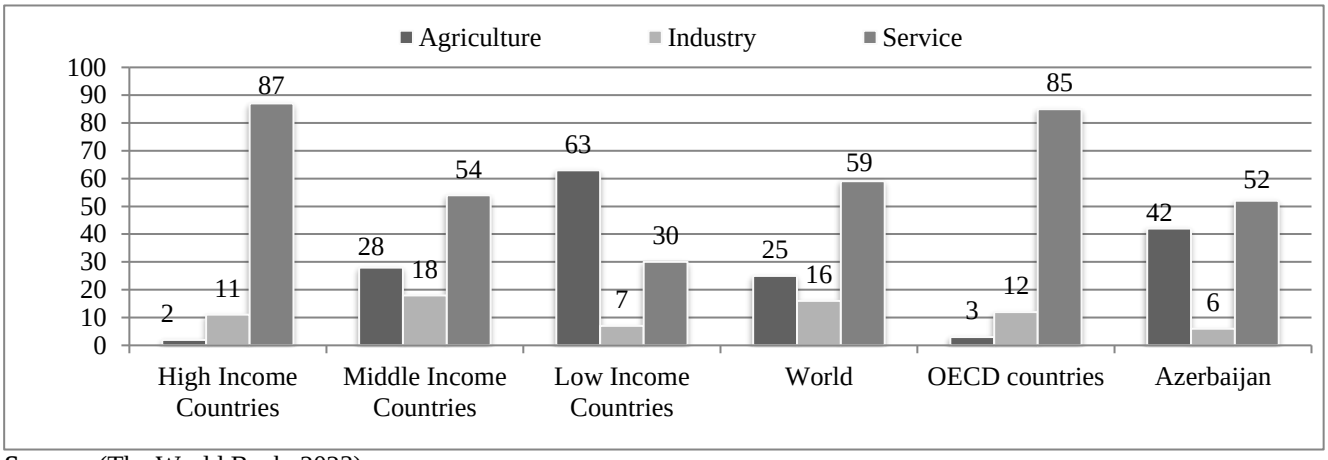
Table 2: Distribution of Part-Time Employees by Weekday Working Hours and Gender (According to result and gender, %)

Working hours	**Based on results**		**Sex**	
	Females	Males	Females	Males
Less than 9 hours	0,1	0,3	39,8	60,2
9-15 hours	14,6	6,0	78,6	21,4
16-20 hours	15,6	16,0	59,5	40,5
21-30 hours	69,7	77,7	57,6	42,4
Total	100,0	100,0	60,2	39,8

Source: (SSCRA, 2023)

42.2% of all active women in Azerbaijan work in agriculture (Graph 8). The share of men in this field is 30.7 percent. In high-income countries, the proportion of women working in agriculture does not exceed 2%. In low-income countries, the proportion of women working in this field is 63%. On the contrary, in service areas, women's employment is higher in high-income countries and lower in low-income countries. The number of women working in this field in Azerbaijan corresponds to middle-income countries.

Graph 8. Employment of Women in Agriculture, Industry and Service Sectors (2019, %)



Source: (The World Bank, 2023)

When we look at the share of women in harmful working conditions in Azerbaijan, it is observed that it is quite low. Accordingly, a very high percentage of men work in heavy and harmful jobs that do not comply with hygienic conditions, are noisy, contain a lot of harmful chemicals and radiation (Table 3).

Table 3: Distribution of Working in Harmful Labour Condition in Transportation and Storage (2022)

	Share of working in harmful labour conditions by sex, in per cent	
	Women	Men
Working in conditions not meeting sanitary-hygiene norms	3,7	96,3
Worked in conditions where noise is above the norm	6,7	93,3
Worked in conditions where vibration is above the norm	13,7	86,3
Worked in conditions where harmful chemical substances are above the norm	5,2	94,8
Worked in conditions where radiation is above the norm	-	100,0
Worked in conditions where occupational dust is above the norm	0,3	99,7
Worked in hard and harmful work and unfavourable climate conditions	9,9	90,1

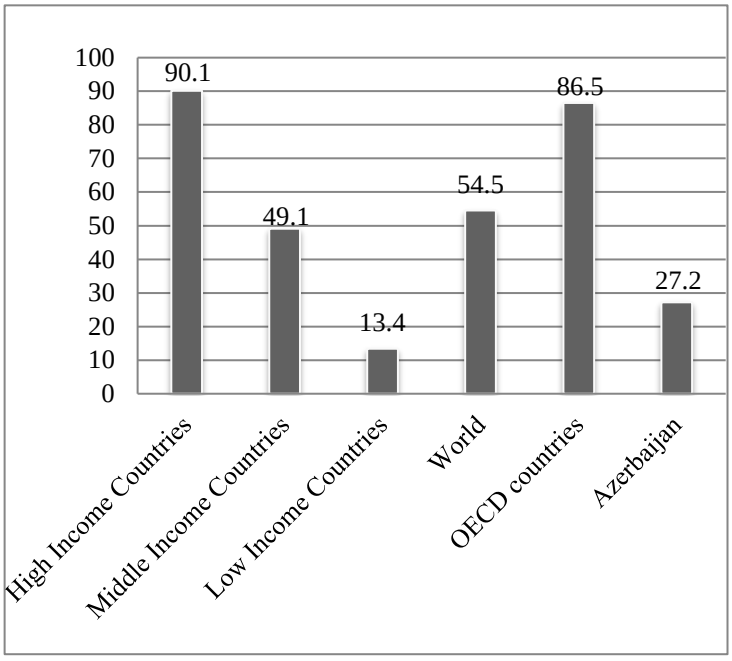
Source: (SSCRA, 2023)

4.5. Fighting Informal Employment in Azerbaijan

Informal employment, according to the Labor Code of the Republic of Azerbaijan, is the performance of certain activities without concluding an employment contract (contract). Globally, it is estimated that two billion (61%) of the active population earn their living by working in the informal economy (ILO, 2018). This demonstrates that illegal work occurs everywhere in the world, regardless of socioeconomic advancement. In developing countries compared to developed countries, this type of work is more prevalent. Unregistered workers are forced to work largely because they cannot find a livelihood. Workers in the informal sector face risk and challenging circumstances (Bonnet, Vanek & Chen, 2019).

According to the UN, *"In developing countries, the informal sector is the primary source of employment for women. Informal workers include street vendors, small traders of goods and services, those engaged in agriculture only for the family, and those working in industry under service contracts*."(UN, 2023). In Azerbaijan, women who do jobs such as babysitting, patient care, home cleaning service, and teaching outside of school are largely not officially employed. According to the World Bank, only 54.5% of women worldwide are in paid work (Graph 9). In high-income countries, the share of women in paid work is much higher than in middle- and low-income countries.

Graph 9. Women Earning a Wage and Working in Paid Jobs (2019, %)



Source: (The World Bank, 2023)

One of the main problems with women's employment in Azerbaijan is the high rate of informal employment. Unfortunately, there are no official statistics on the size of the informal economy in Azerbaijan. However, according to some statistical indicators, it can be estimated. In 2018, 67.2% of the employed population was non were participants in the formal labor market. In 2021, 39.5% of women worked in salaried jobs. According to statistical indicators, it can be said that the rate of women working in the non-public sector is high in Azerbaijan. In comparison to men, women are more likely to be represented in informal employment. Women who work informally are denied social benefits like retirement, paid maternity leave, and unemployment insurance.

Various policies are implemented to prevent informal employment in Azerbaijan. This issue still constitutes the priority of social policy. In 2017, the Activity Plan on the prevention of non-public employment was approved. The document envisages "*the implementation of measures such as improving normative legal procedures, improving management, strengthening control measures to prevent informal employment, and establishing a monitoring and evaluation system."* (E-Kanun, 2017).

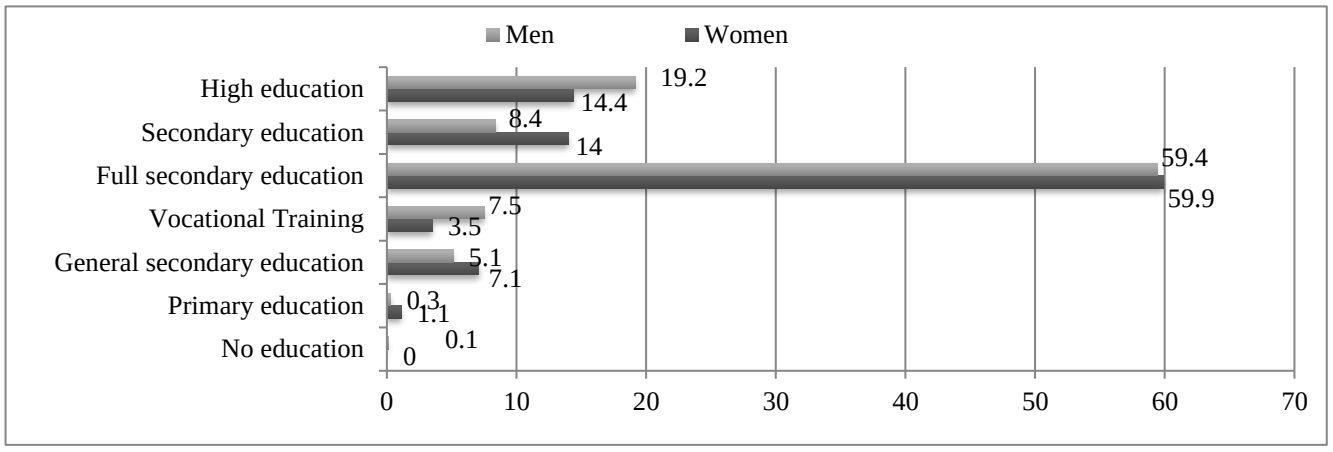
By the decision of the Council of Ministers of the Republic of Azerbaijan dated 2020, the procedure for carrying out and the coordination of control measures in the field of legalization of unregistered employment has been approved. The Republic of Azerbaijan's 2019–2030 Employment Strategy identified the high percentage of unemployed women as one of the key issues facing the labor market. One of the primary objectives of the paper is to achieve decent work and effective employment for all population groups, including women, by 2025, with a focus on minimizing unemployment among women by 2030 (E-Kanun, 2018).

Conditions are established under the self-employment program run by the State Employment Agency, which is connected to the Ministry of Labor and Social Protection of the Population, in order to boost job options for women in Azerbaijan. Through the initiative, low-income families can become entrepreneurs, own their own private farms and generate additional money, and stop relying on government support. Every year, increasing numbers of women are taking part in the program. Women are encouraged to enroll in vocational training programs and launch small enterprises. Within the program's framework, financial assets were given to 2,000 jobless and job-seeking individuals as of the start of 2022. Of these, about 500 are female (Ministry of Labor and Social Protection of the Population of the Republic of Azerbaijan, 2023). In Azerbaijan, the proportion of female self-employed workers and entrepreneurs is rising daily. In 2004, only 3% of women founded firms; by 2020, that percentage had risen to 35.3 percent. More women's businesses; It focuses on the real estate agency and retail sales sectors. The most important obstacles to women becoming self-employed are; Limited access to loans, lack of knowledge about business management, lack of capital, family responsibilities, and the fact that women entrepreneurs are seen as an unusual phenomenon by society can be listed (Gomółka, 2021: 186-187). In Azerbaijan, creating jobs and expanding existing ones is the primary strategy for preventing informal work. Encouraging, secure, and long-lasting work environments are essential, as are better working conditions, increased worker rights, higher living standards, and enhanced social protection. Combating informal employment in Azerbaijan will be crucial to safeguarding the population's labor rights, expanding access to social safety nets, maintaining family income stability, and providing dependable social security for the elderly.

4.6. Education Level of Working Women in Azerbaijan

Education is one of the key components in creating jobs. A statistical analysis reveals that a very small percentage of working women in Azerbaijan possess a high level of education. This data shows that in 2021, the percentage of women was 14.4%. This indication is greater for men (19.2%) (Graph 10). A key component of raising living conditions and lowering unemployment is vocational education. Education is a matter that requires considerable thought, particularly when it comes to securing youth employment, building a competitive economy, and creating a developed community (Aliyeva, 2023).

Graph 10. Distribution of Education Level of the Population by Gender in Azerbaijan (2021)



Source: (SSCRA, 2023)

In Azerbaijan, 3.5% of women and 7.5% of men engaged in economic labor have vocational education. 59.9% of working women have completed secondary education. Higher education and having a certain professional qualification have an exceptional role in increasing women's employment, earning high income and developing the economy.

5. Problems and Policy Recommendations for Women's Employment in Azerbaijan

In Azerbaijan, 50.1 percent of the population are women (2020). Free public education has led to an increasing proportion of the country's population completing secondary education, with university students increasing by 30 percent. Although the number of economically active women is increasing and more women are being employed, women's wages remain very low compared to men, women's unemployment is high and women's participation in the workforce lags behind men. In addition, policies for women have been developed and strategies for self-employment have been developed with initiatives such as the Women's Security National Action Plan, Poverty Reduction Program, Socio-Economic Development Program of the Regions, Food Security Program and "Azerbaijan 2020" development concept. However, missing data prevents the amount of funding provided by the Enterprise Development Fund until 2020 from being seen (Gomółka, 2021: 185-186). The absence of comparable data, which is very important for monitoring SDG 5, and the lack of an institutional structure of data measurement processes make it difficult to eliminate gender inequalities (Dhar, 2018: 67-68). In addition, Niftiyev (2017), in his study on women's labor in Azerbaijan, pointed out that raw material exports in oil-rich countries harm women's labor, and at this point, he emphasized the need to develop institutional mechanisms to increase the female workforce. Azerbaijan is one of 74 economies that legally prohibit women from working in certain sectors. Additionally, it is against the law in Azerbaijan to hire women in positions requiring strenuous physical labor. Although there is no risk assessment or evidence-based justification, it is thought that these restrictions were introduced to protect women's health. Although there are sharp distinctions between the jobs performed by men and women, the difference in employment rates between men and women is relatively small. While men work in better-paid jobs, women mostly work in low-paying jobs such as education and healthcare. In addition, social norms in Azerbaijan still have a negative impact on students' education and career choices, disrupting the integration of women into the workforce (The World Bank, 2021)

Although progress has been made in terms of women's rights and women's labor in Azerbaijan, the policy measures that need to be taken towards problematic areas can be summarized as follows (Gomółka, 2021: 186-187; Niftiyev, 2017: 17-18; Şeren, 2018:104; The World Bank, 2021):

- Developing methodologies and classifications for the problem of data deficiencies (disaggregated data) in gender statistics and making them stable. In this context, it is important that a single framework for women's labor be presented.
- Integration of economically active women into the labor market should be included in projects and action plans as a strategic goal.
- Creating funds by removing obstacles to women's entrepreneurship (encouraging gender sensitivity of budgets)
- Availability of micro-loans should be increased in rural and urban areas
- Women's participation in the mining sector should be supported
- Women should take more part in public decision-making processes
- Improving gender perceptions

- Cooperation of NGOs, academia and international organizations
- Eliminating job restrictions and paving the way for women, who constitute half of the population, to undertake certain jobs, thus enabling the creation of a competitive economy and human capital.
- The labor law should be modernized and women's career choices should be supported instead of determining suitable jobs for women.
- Legal and supervisory processes must be tightened to prevent unregistered employment.

In order to achieve the SDG, first of all, it is necessary to establish accountable and transparent processes by ensuring that the conditions for needs and human rights comply with international standards. Determining the targets for SDG with clear dates and targets will also help the process to run efficiently. In addition, NGOs should be included in the processes and stakeholders from all sectors, the private sector and academics should cooperate (Scholz, 2017: 36). On a global scale, SDG 5 is not yet at a target level. Prejudices against women, inadequate access to health services, and unequal political representation and economic conditions are ongoing problems that hinder concrete progress. In this context, investments in gender equality should be increased on a global scale, discriminatory laws should be abolished and women's integration into decision/representation mechanisms should be ensured. Otherwise, any disruption in the SDG 5 process will also lead to a disruption in the 2030 Agenda for Sustainable Development. Slow progress on gender inequalities could lead to a regression of existing gains. At this point, a policy proposal focused on employment creation alone will have difficulty in achieving the expected successful result without a gender focus. By eliminating the obstacles to women's participation in the workforce (social norms, household care obligations), the way for women to be included in the workforce can be further paved. However, not having clear targets for gender equality and not allocating the necessary budget may further deepen gender inequalities. In order to achieve the SDGs, policies and programs developed specifically for women and girls should be the priority and main target of governments (UNStats, 2023b: 12- 13).

6. Conclusion

Azerbaijan has a legal framework that ensures gender equality in employment. However, based on statistical data, women's employment rates are low in Azerbaijan and around the world (although there are no relatively large differences with men, except for harmful labor). In Azerbaijan, women are mostly represented in the fields of health and social services, education and recreation, entertainment and arts. The employment level in the agricultural sector (42%) is quite high compared to developed countries (2-3%). The average monthly salary of salaried women in Azerbaijan is lower than that of men. However, in areas where women are more represented, wages and the proportion of women with higher education relative to the education level of the population are lower than men. The majority of women in the active population (59.9%) have full secondary education. The high percentage of informal employment among women in Azerbaijan is one of the key issues with their employment. In Azerbaijan, very few women work in paid jobs based on a formal employment contract. Organizing education campaigns among women is of great importance in the fight against informal employment. In addition, it is essential to raise the level of living for the populace, increase the number of permanent jobs, enhance working conditions, increase workers' labor rights, and enhance social protection.

There are also deficiencies in gender data, which is very important for monitoring the SDG in Azerbaijan. According to UN data, 49.1 percent of the gender data required to monitor gender inequalities is missing in Azerbaijan. Availability of gender data, which is very important in detecting deficiencies and inequalities, can encourage decision-makers and help in the production of accurate and effective policies. However, these data gaps need to be closed as much as possible to monitor progress within the scope of the SDG on a gender-specific basis. to achieve the SDGs, women must be integrated into social, political and economic life. At this point, governments should allocate resources to realize women's rights and ensure gender equality. With the active position of NGOs, academia and international organizations in the process, women's equal representation in all fields and their greater participation in employment must be ensured, and an accountable and transparent system must be built. Therefore, removing business restrictions for women, who constitute half of the population, encouraging women's entrepreneurship and increasing women's inclusion in the workforce will achieve SDG targets not only with gender equality but also with inclusive and sustainable economic growth.

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RESP

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Sustainability of Flexible Plastic Packaging for Instant Coffee: Evaluation of Environmental Impact and Recyclability

Hazır Kahve İçin Esnek Plastik Ambalajın Sürdürülebilirliği: Çevresel Etkilerin ve Geri Dönüştürülebilirliğin Değerlendirilmesi

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ANAHTAR KELİMELER

Hazır kahve
Geri dönüşüm
Yaşam Döngüsü Düşüncesi
Sürdürülebilir ambalaj
Çok katmanlı ambalaj

ÖZ

Brezilya'da hazır kahveler yaygın olarak PET(polietilen tereftalat)/Al(alüminyum)folyo/LDPE(düşük yoğunluklu polietilen) bazlı dik poşetlerde pazarlanmaktadır. Alüminyum folyo etkili bir nem bariyeri tabakasıdır. Ancak tüketici sonrası esnek ambalajlar genellikle malzeme ayırma zorluğu ve geri dönüşüm hatlarındaki uyumsuzluk nedeniyle çevre sorunlarına neden olmaktadır. Bu çalışmanın amacı, hazır kahve paketlemeye yönelik alternatif malzemelerin bariyer özelliklerini, su buharı ve oksijen iletim hızını (WVTR/OTR) ve geri dönüştürülebilirlik potansiyelini değerlendirmektir: (1) LDPE/HDPE(yüksek yoğunluklu polietilen)/LDPE, (2) BOPP(iki yönlü polipropilen)/BOPPmet(metalize)/PP, (3) PET/PETmet/LDPE ve (4) PET/BOPPmet/LDPE. Malzemelerin WVTR'si 0,37 g su m-2 gün-1'e (25°C/%75RH) kadardır ve OTR'si 3,95 mL (NTP) m-2 gün-1'e kadardır; bu durum pazar cirosu yüksek olan ürünün raf ömrünü garanti edebileceklerini göstermektedir. Geri dönüşüm testleri yalnızca (1)'in PE geri dönüşüm hatlarıyla uyumlu olduğunu göstermektedir. (3) ve (4)'teki geri dönüştürülmüş filmler bazı önemli mekanik özelliklerde artış gösterdi. (1) ve (4) değerlendirilen çevre boyutlarındaki en yüksek azalmayı gösterdi.

KEYWORDS

Instant coffee
Recycling
Life Cycle Thinking
Sustainable packaging
Multilayer packaging

ABSTRACT

In Brazil instant coffees are widely marketed in stand-up pouch based on PET (polyethylene terephthalate)/Al(aluminum) foil/LDPE (low-density polyethylene). Aluminum foil is an efficient moisture barrier layer. However, the post-consumer flexible packaging usually causes environmental problems due to the difficulty of materials separation and incompatibility in the recycling lines. The aim of this study was to evaluate the barrier properties, water vapor and oxygen transmission rate (WVTR/OTR) and recyclability potential of the alternative materials for packing instant coffees: (1)LDPE/HDPE(high-density polyethylene)/LDPE, (2)BOPP(bioriented polypropylene)/BOPPmet(metallized)/PP, (3)PET/PETmet/LDPE and (4)PET/BOPPmet/LDPE. WVTR of the materials was up to 0.37g of water m-2 day-1 (25°C/75%RH) and OTR was up to 3.95mL (NTP) m-2 day-1 indicating they can guarantee the shelf-life of the product with high market turnover. Recycling tests showed that only (1) is compatible with PE recycling lines. Recycled films from (3) and (4) showed increase in some important mechanical properties. (1) and (4) showed the highest reductions of environmental aspects evaluated.

1. Introduction

Circular economy combines economic development with the best use of natural resources and it is a trend in all sectors of society. In terms of packaging, it means relying less on

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virgin raw materials, prioritizing more durable, recyclable 'and renewable' inputs (Ellen MacArthur Foundation, 2021). The search for plastic packages that replace non-recyclable materials has motivated large companies to figure out viable and efficient solutions for packaging. Besides, the new options must maintain the quality of food. This demand paves the way for increasingly demanding markets and consumers in terms of consumption of products with low environmental impact (Food Packaging Forum, 2019).

From the point of view of purchase intention, Rokka and Uusitalo (2008) studied the attributes of packaging that guide consumers in the act of purchasing products, including sealing capacity, branding and recyclability. In a similar study, Wang et al. (2021) pointed out a significantly positive effect of the recyclable packaging on the choice behavior of consumers who participated in the survey, which indicates that ecologically correct packaging that includes being manufactured with potentially recyclable materials is an important factor that drives intention of purchasing. Factor for which consumers are willing to pay more (Klaiman et al., 2016).

The replacement of packaging materials, especially for options with reduced thickness, which represent a reduction in resources, or options made by single material is one of the main goals of manufacturers, but it does not always bring benefits. Thickness reduction, for example, may represent the use of multilayer films that sacrifice material recyclability (Barlow and Morgan, 2013). For some food products, this substitution is relatively easy; for others, more demanding in terms of protection, such as dry and powdered products, it is a challenge to overcome. Instant coffees fall into the last category.

Moisture gain plays a critical role in affecting the quality and shelf life of instant coffee, as due to its high hygroscopic behavior, it is susceptible to deterioration when exposed to moisture contents ranging from 7% to 8%, which cause agglomeration of the powder or of the granules and makes it pasty or paved (Robertson, 2013). To maintain the quality of the product, Brazilian legislation establishes a maximum humidity of 5% (on a wet basis) as a specific requirement for the class of soluble products (ANVISA, 2005), which is achieved using packaging materials with a functional barrier layer to water vapor.

In Brazil, instant coffee is sold in flexible stand-up pouch packages, used as refill for glass jars, and in small sticks for individual doses, both manufactured in multilayer film (PET/Al foil/LDPE) containing aluminum foil as a functional barrier layer for gas permeation, moisture and aroma loss. Flexible packaging has a lower production cost and greater mechanical resistance than rigid packaging, which reduces product losses in the filling, storage, retail outlets and final disposal. The laminated and stand-up pouch structure of the PET/Al foil/LDPE films ensures that the products are placed vertically on the retail outlets shelves, allowing the consumer to see the product easily (Andregheti, 2015).

Flexible packaging made up of single material is potentially recyclable and has efficient recycling systems. However, the flexible plastic packaging currently employed to pack instant coffee does not appeal to sustainability and represents a problem from an environmental point of view due to the difficulty of separating the materials of the structure and its incompatibility in the recycling lines for plastic materials (Tartakowski, 2010; Barlow and Morgan, 2013; Teixeira, 2013). The film structure is laminated with aluminum, which limits its mechanical recycling to thermo-press recycling due to the impossibility of prior separation of the structure layers.

The environmental impact of plastic packaging is indicated by energy consumption, which includes contributions from the energy consumed to manufacture the polymer (called embodied energy) and the energy required to manufacture the film (about 10% of embodied energy). Thus, the plastic packaging consumes a lot of energy for manufacturing and generate a substantial negative environmental impact (Barlow and Morgan, 2013).

Unfortunately, polymers are considered low commercial value waste and returning the material to the reuse cycle is considered logistically expensive. Films are often rejected from recycling waste streams due to their lightness and diversity of polymers; besides multilayer films cannot be separated in a single polymer type. However, if recycled, they can avoid unnecessary energy consumption and be beneficial to the environment by replacing, in some cases, the use of virgin resin, resulting in a reduction in the amount of waste generated (Barlow and Morgan, 2013; Kaiser, 2018).

Therefore, the objective of this work was to evaluate the recyclability and environmental impact of four options of potentially recyclable flexible plastic structures to pack instant coffee, which were selected based on the water vapor permeability rate required by this class of product.

2. Material And Methods

2.1. Flexible material structures

Four alternative plastic material structures without aluminum foil for instant coffee were evaluated in this study, as follows:

1 - LDPE 33 µm/HDPE 33 µm/LDPE 32 µm – 81.98 g m^{-2}

2 - BOPP 29 µm/BOPPmet 16 µm/PP 26 µm – 98.31 g m^{-2}

3 - PET 12 µm/PETmet 12 µm/LDPE 67 µm – 103.19 g m^{-2} - printed

4 - PET 10 µm/BOPPmet 11 µm/LDPE 53 µm – 92.75 g m^{-2} - printed

2.2. Water vapor transmission rate (WVTR)

Water vapor transmission rate of flexible plastic structures was evaluated employing Permatran-W 3/33 model - WVTR analyzer, from Mocon (Minneapolis, USA) according to ASTM F1249-20 (2020, US) performed at 38

ºC/80% RH – international ambient conditions and by gravimetric method according to ASTM E96/E96-M-22ae1 (2022) performed at 25 °C/75% RH – Brazilian ambient conditions.

2.3. Oxygen transmission rate (OTR)

Oxygen transmission rate of flexible plastic structures was evaluated employing Oxtran model 2/60, from Mocon (Minneapolis, USA) performed at 23 °C and 0.21 atm of partial pressure of oxygen according to ASTM F1307 (2014).

2.4. Recyclability

The recyclability of the studied materials was evaluated based on the recyclability assessment protocols available for polyethylene and polypropylene films (RecyClass, 2021a; RecyClass, 2021b; The Association of Plastic Recyclers, 2020) in order to determine whether the structures evaluated are compatible with post-consumer PE and PP film recycling chains.

Approximately 40 kg of each studied film was crushed and incorporated in two different proportions (12.5% and 25.0%) into the control resins employed to produce the recycled films. Control resins were selected considering the polyolefin with higher content in the structure, which are: structure 1: 100% HDPE, structure 2: 100% PP and structures 3 and 4: 80% LLDPE/20% LDPE. The methodology consisted of three steps: 1) Pre-treatment of the flakes, 2) Extrusion of pellets and 3) Conversion of pellets to obtain recycled films.

2.4.1. Pre-treatment of the flakes

Control and studied films were separately grinded in a Grinder Wortex GSG 300/800 model (Campinas, Brazil) to flakes of 10 to 20 mm. Printed structures were washed to evaluate the impact of inks in wet washing operations, as follow: 1 g:24 mL water ratio at room temperature and stir at 1000 rpm for 10 min, followed by rinsing at 500 rpm for 5 min.

Flotation test 1g:24 mL water ratio at room temperature and stir at 500 rpm for 10 min was adopted to determine if the flakes can be separated by density in float/sink tank used in the recycling operation.

Drying for moisture content determination by heating 2 kg of studied materials in an Eletrolab oven 122 FC model (São Paulo, Brazil) at 60 ºC and weighting after 6 h e 12 h.

2.4.2. Extrusion of pellets

Pellets composed by 100% control flake (A.0), 75% control flake and 25% studied material (A.25) and 50% control flake and 50% studied material (A.50) were extruded in an Extruder and Recycler Wortex model Challenger II Generation – 600 mm L/D 42 (Campinas, Brazil). The pellets were evaluated regarding to:

Relative density according to ASTM D792-20 (2020, US). 1g of pellet was pressed and had its specific mass determined in water by weighting in analytical balance Sartorius (Göttingen, Germany) with 10-5 g accuracy at ambient temperature (23°C).

Melt flow rate of pellets was obtained according to ASTM D1238-20 (2020, US) in a Melt flow tester from CEAST (Pianezza, Italy). A standard load of 2.16 kg was applied for all materials at a die temperature of 190 ºC (PE materials) and 230 ºC (PP materials) and flow of material was observed for time. The material weight that flowed through die cavity for time gave the MFI in g 10 min-1.

Thermal properties were evaluated by Differential Scanning Calorimetry (DSC) carried out using a DSC 250 model from TA Instruments (New Castle, USA) (ASTM D3418-15, US). Approximately 5 mg of the material were analyzed in a hermetic pan. Initially the thermal history of the sample was destroyed by heating from 25 ºC to 300 ºC and then holding at 300 ºC for 5 minutes, and then the sample was cooled to 25 ºC and held for 5 minutes. A second heating up to 300 ºC was performed using the same conditions. Both heating and cooling were done at a rate of 10 ºC per minute.

2.4.3. Production of recycled films

Blown films (90 µm thickness) were produced with the following compositions: B.0 - 50% A.0 pellet and 50% virgin pellet, B.25 - 50% A.25 pellet and 50% virgin pellet and B.50 - 50% A.50 pellet and 50% virgin pellet. The films were extruded in a 5-layers Coex Extruder Dr Collin Blown Film BL180/400 model (Germany) and evaluated by:

Thickness was obtained according to ISO 4593-93 (2020, Switzerland) standard using a digital indicator equipment Mitutoyo ID-H0530E model (Kawasaki, Japan). Five specimens of 10 cm² area were evaluated. Total of 25 determinations were done.

Mechanical properties of films obtained from the recycling process was evaluated by:

Tensile strength and elongation - Maximum tensile strength (TS) and elongation at break (E) in transverse direction (TD) and machine direction (MD) of studied materials were determined in an INSTRON instrument 5966–E2 model (Norwood, USA) with load cell 100 N, speed 500 mm min-1, claws distance 50 mm for structures 3 and 4 – B.25 and B.50 (TD and MD); load cell 1 kN, speed 12.5 mm min-1, claws distance 125 mm for structure 1 – B.0 (TD); load cell 1 kN, speed 500 mm.min-1, claws distance 50 mm for structures 1 and 2 – B.25 and B.50 (MD) and structures 2, 3 and 4 – B.0 (TD and MD); load cell 1 kN, speed 50 mm.min-1, claws distance 100 mm for structure 1 – B.0 (MD) and structures 1 and 2 – B.25 and B.50 (TD). Tensile test was performed following the ASTM D882-18 (2018, US) standard. Test specimens with 15 mm width and 100 mm length were used.

Dart impact - Dart impact resistance of studied materials was determined according to ASTM D1709-22 (2022, US), in

Davenport equipment serial FD nº 50/150 (London, England). The specimen (125 mm diameter) was fixed by means of vacuum and metal rings. The dart with a head diameter of 38 mm and with the necessary weight increments was positioned at 660 mm from the specimen. The impact of the dart occurred in the center of the specimen. The mass needed to cause failure in 50% of the analyzed specimens was determined (P50).

Tear strength - Tear propagation resistance was determined according to ASTM D1922-15 (2020, US) standard. Elmendorf equipment ED 1600 model Regmed (Osasco, Brazil) was used, which consists of a calibrated pendulum, whose movement causes the propagation of the tear in the specimen. The work required to perform this tear is measured by the potential energy loss of the pendulum. This loss is indicated by a pointer on a graduated scale from 0% to 100% of the capacity, in this case, 1600 gf for the equipment used.

Surface appearance and Amount of gels and specks larger than 200 µm in 500 cm² were evaluated by visual observation.

Total light transmission was determined based on ASTM D1003-21 (2021, US). Spectra were obtained on an Analytik Jena UV-Visible Specord 210 spectrophotometer (Jena, Germany) in the range 200 nm to 800 nm at a speed of 120 nm min-1 using an integration sphere as accessory. Three specimens with approximately 10 mm x 30 mm from different parts of the films were evaluated.

Stereomicroscopy to obtain images 10x magnification of films surfaces was performed in Leica equipment M165C model (Heerbrugg, Switzerland) with LAS EZ Leica Application Suite Software Version 3.0.0.

Scanning electron microscopy (SEM) was performed in ZEISS equipment DSM 940a model (Oberkochen, Germany) with 200x magnification. Pieces of cross section of films were cut in a rotating microtome Leica 2245 model (Buffalo Grove, US), with a cut thickness of 100 microns, and later fixed on aluminum stubs with carbon adhesive and covered with two layers of gold (40 mA / 40 s), in metallizer Balzers SCD 050 model (Fürstentum, Liechtenstein). The microphotographs taken in SEM system were complemented by the secondary electron detector (relief contrast, image topography, SE) and the backscattered electron detector (BSE), which composes images providing an indication of the material composition by the similarity of hue, that is, regions with the same hue have a similar chemical composition. The images of BSE regions with elements of lower atomic weight have a darker shade compared to the other regions.

2.5. Environmental profile

To estimate the environmental performance of the four studied materials and the material employed nowadays in the market to pack instant coffee a Life Cycle Thinking was applied. The estimation of the potential environmental impacts was based on the guidance of ISO 14040 and 14044 standards (ISO, 2006).

2.5.1 Goal and scope

The goal of the study was to evaluate possible environmental gains due to the substitution of the current packaging of instant coffee by some of the four studied materials.

The scope was to evaluate the production of the materials of each film (extraction of raw materials and production of the plastics or aluminum) and the end-of-life stage of the packaging (recycling or landfill). The other life cycle stages were considered equal to all materials and then were not accounted for.

2.5.2 Functional unit

The functional unit adopted was one m² of film.

2.5.3 System boundary

The system under study included the production and disposal of the primary packaging taking into account the attributional approach. Since this study has a comparative basis among the materials, the other life cycle stages were considered unchanged and then they were excluded from this evaluation. Secondary data obtained from recognized databases available in GaBi 6 Product Sustainability software were used for materials (PE International A.G.) and packaging production (ELCD database 2.0) as described in Table 1.

Table 1. Secondary data employed in the Life Cycle Thinking study.

Material/Stage	Dataset	Database
PET	Polyethylene Terephthalate Granulate (PET) via DMT, production mix, at plant - DE	PE International
Aluminum foil	Primary production, production mix, at plant, 5 to 200 µm - EU-27	PE International
LDPE	Polyethylene film (LDPE) technology mix, production mix, at producer - RER	Plastics Europe
HDPE	Polyethylene High Density Granulate (HDPE) Mix, technology mix, production mix, at plant - DE	PE International
PP film	Polypropylene film (PP) technology mix, production mix, at producer - RER	Plastics Europe
Landfill	Landfill of plastic waste - EU-27	PE International

Datasets corresponding to a European average were preferentially selected, which are considered representative for Brazilian production since the technologies employed in Brazil are quite similar to the European countries once many

Brazilian industries import equipment from Europe. The disposal scenario refers to the Brazilian situation in the year 2021 with a recycling rate of 23.4% for post-consumer plastics (ABIPLAST, 2022). This recycling rate is obtained from door-to-door selective collection in Brazilian municipalities that have a selective collection system, in which consumers dispose of solid waste in two groups (recyclable - all types of packaging material and organic - food waste).

2.5.4 Environmental impact categories

The environmental impact categories adopted in this study are climate change (global warming potential for a 100-year perspective - GWP_{100}, excluding biogenic carbon), fine particulate matter formation - PMFP (BR specific), freshwater eutrophication - FEP (BR specific), terrestrial acidification - TAP (BR specific), water depletion - WDP, fossil depletion - FFP and freshwater ecotoxicity - FETP, and abiotic depletion (ADP fossil), which were estimated according to the ReCiPe 2016 v 1.1 Midpoint (Hierarchist perspective), since this method has characterization factors that are globally or Brazilian oriented. Furthermore, the impact category primary energy demand (PED) from renewable and non-renewable resources (net calorific value), which considers direct and indirect fuel consumption was calculated using the GaBi 6 Product Sustainability software program. Data modeling was performed by means of the GaBi 6 Product Sustainability software program (PE…, 2015).

2.6. Statistical Analysis

The results were statistically evaluated by means of analysis of variance (ANOVA) and the Tukey test to compare the averages ($p < 0.05$).

3. Results and Discussion

3.1 Water vapor and oxygen transmission rate (WVTR and OTR)

Table 2 shows water vapor and oxygen transmission rate of alternative materials evaluated.

Table 2. WVTR and OTR of alternative materials evaluated in this study.*

Material	WVTR (g water.m^{-2}.day^{-1})		OTR (mL (NTP) m^{-2} day^{-1})
	at 38°C/90% RH International ambient conditions	at 25°C/75% RH Brazilian ambient conditions	at 23ºC and 1 atm of partial pressure gradient of oxygen
1	0.51 ± 0.04^{c}	0.11 ± 0.00^{c}	0.20 ± 0.02^{d}
2	0.22 ± 0.05^{c}	0.04 ± 0.00^{c}	0.37 ± 0.01^{c}
3	1.97 ± 0.45^{b}	0.19 ± 0.03^{b}	1.07 ± 0.00^{b}
4	3.41 ± 0.18^{a}	0.37 ± 0.07^{a}	3.95 ± 0.12^{a}

* mean ± standard deviation, 1 = LDPE/HDPE/LDPE; 2 = BOPP/BOPPmet/PP; 3 = PET/PETmet/LDPE; 4 = PET/BOPPmet/LDPE; ^{a,b,c,d} means followed by the same letter, in the column, do not differ at 95% confidence level ($p < 0.05$).

Souza (2022) showed that headspace gas composition of the Brazilian packaging systems does not have modified atmosphere, i.e., Brazilian instant coffee products are packaged in air. This study demonstrates that O_2 inside packaging is not a critical parameter for instant coffee products, which means that despite traditional stand-up pouch packaging with aluminum foil has an efficient gas barrier it can be replaced by another structure. Structures **1** and **2** present good oxygen barriers ranging from 0.20 to 0.37 mL (CNTP) m^{-2} day^{-1}, as shown in Table 2.

WVTR of the materials evaluated in this study indicates structures **1** and **2** do not differ significantly from each other ($p < 0.05$) in the two ambient conditions. Statistical analysis also demonstrates the same difference among the WVTR of the four materials at 38°C/90% RH and at 25°C/75% RH.

Flexible packaging composed by PET/ Al foil (11 µm to 15 µm)/LDPE currently used to pack instant coffee has a WVTR lower than 0.001 g water m^{-2} day^{-1} at 38°C/80% RH. According to Robertson (2013), flexible packaging for instant coffee containing aluminum foil (12 µm thickness) provide shelf life of up to 12 months. When instant coffee is packaged in other plastic materials that do not have such efficient O_2 and moisture barrier this time is very short.

Metalized layer (approx. 30 nm) applied to polymeric films, often PP or PET also increases the barrier of the material (Barlow and Morgan, 2013). Alves and Bordin (1998) studied the shelf life of individual packages (25 g and 50 g) for instant coffee at 30 °C/80% RH in three plastic structures: LDPE, BOPP/pearled BOPP and metallized PET/LDPE. These films presented mean WVTR of 6.1 g water m^{-2} day^{-1}, 1.2 g water m^{-2} day^{-1} and 0.9 g water m^{-2} day^{-1}, respectively.

Thickening and mixing of materials, such as polyolefins, can also increase the barrier properties of film structures. Flexible food packaging has thicknesses ranging from 10 µm to 250 µm depending on the combination of strength, durability and functional barrier demand for its application. The use of PE or PP with 70% of the total film thickness brings a gain in the mechanical properties of the film, in particular the hardness that gives resistance to piercing and splitting (Barlow and Morgan, 2013).

According to Souza (2022), the minimum WVTR necessary to pack instant coffees is 0.042 g water m^{-2} day^{-1} for spray dried product and 0.057 g water m^{-2} day^{-1} for freeze-dried

product. These results were predicted at 25°C/75% RH for critical moisture of 5% (ANVISA, 2005), packaging area of 0.0256 m², product weight of 50 g and storage time of 365 days. This study also indicated that increasing the packaging area to 0.0585 m^2 (product weight of 200 g) WVTR values change to 0.073 g water m^{-2} day^{-1} and 0.100 g water m^{-2} day^{-1} for spray dried product and freeze-dried product, respectively. Therefore, flexible material **2** could be employed to pack instant coffee of 50 g or higher, while the other structures could be used for 200 g packs with lower shelf life.

3.2. Recyclability

3.2.1. Flakes

Washing test: Printed flakes obtained from materials **3** and **4** do not shed color, suspended particles and fibers in the washing water, which indicates zero impact in wet washing operations.

Flotation test: Material **1** showed mostly flakes in suspension, but no apparent phase separation. Materials **2**, **3** and **4** showed flakes suspended, without phase separation and dispersed in liquid medium. PET is a high-density polymer, then, structures **3** and **4** were expected not float. However, BOPP is a low-density polymer and produces light films (material **2**). The expectation was that BOPP-based films would float easily. One possibility for this result is the higher amount of BOPP film per gram of water than other films due to the smaller thickness, which implies in higher area of film g^{-1} of water and then, higher volume of cutted film g^{-1} of water. Higher amount of material turns harder the phase separation in material/water ratio indicated by the flotation procedures. Therefore, the results indicated only flakes from structure **1** can be easily separated by density in float/sink tank used in the recycling operation.

Drying:

Table 3 shows moisture content results of flakes of alternative materials

Table 3. Flakes moisture content.*

Flakes from alternative plastic flexible material	Moisture content (%)
1 = LDPE/HDPE/LDPE	0.12 ± 0.03^{c}
2 = BOPP/BOPPmet/PP	0.14 ± 0.00^{bc}
3 = PET/PETmet/LDPE	0.20 ± 0.03^{a}
4 = PET/BOPPmet/LDPE	0.17 ± 0.02^{ab}

*mean ± standard deviation; ^{a,b,c} the means, followed by the same letter, in the column, do not differ at the 95% confidence level ($p < 0.05$).

Flakes from alternative materials showed moisture content from 0.12% to 0.20%. Films **3** and **4** retained greater amount of water due chemical nature of PET present in these structures. PET molecules are polar and form hydrogen bonds with H_2O molecules. Excess moisture in the flakes can lead to problems in the final product from recycling process, e.g., spots and blisters. In extruded films, it causes the formation of "fisheye", gels, rupture of the extrusion bubble, among others. According to Shen and Worrall (2014) flakes with less than 0.1% moisture by weight are ready to be reprocessed. It indicates that flakes evaluated, mainly **3** and **4**, should be dried before processing.

3.2.2. Pellets

Table 4 shows some properties of the pellets evaluated.

As **A.0** pellets were processed from 100% flake control, they are adopted as standards in comparison to mixed recycled materials (**A.25** and **A.50**). RecyClass (2021a, b) and The Association of Plastic Recyclers (2020) protocols established some recommendations for the evaluated parameters to check if pellets containing recycled materials can be used in PE and PP recycling lines.

For relative density all pellets attended recycling protocols recommendations, although the materials obtained from structures **3** and **4** showed a significant difference ($p < 0.05$). Pellets from structures **1** and **2** showed only one value for thermal transition temperatures (T_m and T_c) because LLDPE-HDPE and BOPP-PP have thermal behavior very similar showing a single band in DSC curves. Pellets from structures **3** and **4** presented three values for T_m and T_c because they composed mostly by LDPE ($T_{m,c,1}$) - LLDPE ($T_{m,c,2}$) blend and PET ($T_{m,c,3}$). Resins from structures **3** and **4** did not attend the specification since PET has melting temperature > 150°C. Thermal analysis of pellets from alternative flexible plastic structure **2** did not indicate presence of polyethylene what approves the material. However, its melt flow rate did not attend the specification since **A.25** and **A.50** showed values with higher than 15% deviation in respect to **A.0**. Maybe a lower percentage of alternative material in the blend, e.g., A.10, could show melt flow rate compatible with PP lines recycling.

Plastic with melt flow rate from zero to 1 g.10 min^{-1} are suitable for extrusion of film or plastic bags, as well as thermoformed into low trays. Melt flow rate from 0.3 to 5 g 10 min^{-1} are suitable for blow molding to produce bottles (Eriksen et al., 2019). Therefore, structure **2** could be suitable to produce blow molding plastic products while the other structures could be employed for extrusion of films or bags. Statistical analysis of melt flow rate results indicated significant differences ($p < 0.05$) between the evaluated pairs. However, the reduction or increase of the values obtained with the increase of the percentage of recycled material incorporated is not a trend, it depends on the structure/composition of the alternative film.

Table 5. Films properties. *

Identification		Thickness (µm)	Tensile strength (MPa)		Elongation at break (%)		Dart impact (g)	Tear strength (gf)**		Surface appearance	Amount of gels and specks
			TD	MD	TD	MD		TD	MD		
1 - B.0		**92.3 ± 10^{ab}**	**28.7 ± 1.5^{a}**	**30.0 ± 0.7^{a}**	**17.4 ± 3.8^{b}**	**115.4 ± 120^{b}**	**58**	**90 ± 3.3^{c}**	**69 ± 3.1^{c}**	Smooth surface, gels and stains, translucent	33
1	**B.25**	89.5 ± 3.9^{b}	29.1 ± 2,2^{a}	28.7 ± 2.5^{a}	25.6 ± 14^{b}	231.3 ± 120^{b}	**101**	113 ± 4.5^{b}	88 ± 3.8^{b}		34
	B.50	96.2 ± 9.0^{a}	28.6 ± 0.6^{a}	27.5 ± 0.9^{a}	159.5 ± 64^{a}	**505.8 ± 215^{a}**	**125**	**163 ± 5.6^{a}**	**121 ± 11^{a}**		27
2 - B.0		**95.9 ± 6.9^{c}**	**28.9 ± 1.1^{a}**	**29.4 ± 1.0^{a}**	**649.5 ± 139^{b}**	**617.0 ± 28^{a}**	**90**	**117 ± 6.7^{a}**	**86 ± 6.3^{a}**	Smooth surface, gels and stains, translucent	11
2	**B.25**	135.0 ± 22^{b}	*22.3 ± 1.2^{b}*	*22.2 ± 1.9^{b}*	575.0 ± 112^{c}	*20.5 ± 5.8^{b}*	*65*	*74 ± 2.9^{b}*	*48 ± 1.8^{b}*	Rough surface, incrustations, gels and stains, gray coloring, translucent	24
	B.50	174.6 ± 39^{a}	*19.0 ± 0.5^{c}*	*20.2 ± 1.6^{c}*	**1314.8 ± 99^{a}**	553.0 ± 117^{a}	*37*	*66 ± 1.0^{c}*	*40 ± 1.1^{c}*		**133**
3 and 4 - B.0		**95.3 ± 4.2^{c}**	**31.3 ± 2.4^{a}**	**31.2 ± 3.2^{a}**	**889.6 ± 28^{a}**	**828.8 ± 44^{a}**	**759**	**> 1600**		Smooth surface, gels and stains, translucent	19
3	**B.25**	115.2 ± 17^{b}	*18.7 ± 2.0^{b}*	*19.4 ± 1.4^{b}*	786.8 ± 29^{b}	731.5 ± 32^{b}	592			Rough surface, incrustations, gels and stains, green coloring, translucent	13
	B.50	154.0 ± 32^{a}	*12.2 ± 0.9^{c}*	*13.3 ± 3.2^{c}*	712.8 ± 19^{c}	699.8 ± 30^{b}	*402*				**44**
4	**B.25**	116.0 ± 17^{b}	*16.8 ± 1.9^{b}*	*17.6 ± 3.5^{b}*	767.3 ± 24^{b}	727.3 ± 38^{b}	*400*			Rough surface, incrustations, gels and stains, brown coloring, translucent	**103**
	B.50	173.2 ± 39^{a}	*10.4 ± 1.7^{c}*	*10.9 ± 2.8^{c}*	686.6 ± 35^{c}	639.1 ± 70^{b}	*402*				**225**
PE film recommendation (RecyClass, 2021a)		Process adjusted to 100 µm for all films***	No more than 25% delta to B.0							-	Based on application
PE film recommendation (The Association of Plastic Recyclers, 2020)			No more than 25% delta drop to B.0							No more than 25% count increase to B.0 For B.0: Gels - up to 30 Specks - up to 5 Holes - zero tolerance	
PP film recommendation (RecyClass, 2021a)			No more than 25% delta to B.0							-	Based on application

* mean ± standard deviation, TD = transverse direction and MD = machine direction, 1 = LDPE/HDPE/LDPE; 2 = BOPP/BOPPmet/PP; 3 = PET/PETmet/LDPE; 4 = PET/BOPPmet/LDPE, B.0 = 50% control pellet and 50% virgin pellet; B.25 = 50% A.25 pellet and 50% virgin pellet; B.50 = 50% A.50 pellet and 50% virgin pellet, **1600 gf is maximum potential energy, *** value chosen based on the current flexible package for instant coffee (stand up pouch); ^{a,b,c} the means, followed by the same letter, in the column compared to the respective A.0, do not differ at the 95% confidence level ($p < 0.05$).

Table 4. Physical and thermal properties of the pellets.*

Identification		Relative density ($g.cm^{-3}$)	Melt flow rate ($g.10\ min^{-1}$)	Thermal property**	
				T_m (°C)	T_c (°C)
A.0		0.952 ± 0.002^a	1.004 ± 0.008^a	135.1 ± 0.7	118.0 ± 0.5
1	**A.25**	0.947 ± 0.005^{ab}	0.989 ± 0.004^b	133.1 ± 0.6	117.6 ± 0.7
	A.50	0.942 ± 0.002^b	0.925 ± 0.003^c	133.0 ± 0.6	117.6 ± 0.7
A.0		0.895 ± 0.002^a	1.475 ± 0.010^c	147.3 ± 0.7	114.2 ± 0.4
2	**A.25**	0.894 ± 0.005^a	**2.201 ± 0.004**^{b}	153.2 ± 0.9	118.6 ± 0.2
	A.50	0.894 ± 0.002^a	**2.881 ± 0.013**^{a}	157.5 ± 0.7	121.2 ± 0.2
A.0		0.919 ± 0.012^a	0.301 ± 0.006^b	$T_{m,1}$ 108.5 ± 1.2 $T_{m,2}$ 121.1 ± 0.1	$T_{c,1}$ 94.8 ± 0.6 $T_{c,2}$ 107.0 ± 0.1
3	**A.25**	0.859 ± 0.018^b	0.472 ± 0.002 ^{a}	$T_{m,1}$ 109.2 ± 0.7 $T_{m,2}$ 122.1 ± 0.5 **$T_{m,3}$ 230.4 ± 6.0**	$T_{c,1}$ 95.4 ± 0.4 $T_{c,2}$ 107.3 ± 0.3 $T_{c,3}$ 175.2 ± 9.6
	A.50	0.809 ± 0.018^c	0.239 ± 0.006^c	$T_{m,1}$ 109.5 ± 0.7 $T_{m,2}$ 122.2 ± 0.8 **$T_{m,3}$ 228.5 ± 5.0**	$T_{c,1}$ 94.4 ± 0.4 $T_{c,2}$ 107.8 ± 0.3 $T_{c,3}$ 175.1 ± 8.6
4	**A.25**	0.910 ± 0.016^a	0.482 ± 0.006^a	$T_{m,1}$ 109.8 ± 0.7 $T_{m,2}$ 121.8 ± 0.1 **$T_{m,3}$ 224.1 ± 2.8**	$T_{c,1}$ 96.2 ± 0.4 $T_{c,2}$ 106.6 ± 0.1 $T_{c,3}$ 167.8 ± 7.8
	A.50	0.902 ± 0.007^a	0.203 ± 0.007^c	$T_{m,1}$ 107.3 ± 5.1 $T_{m,2}$ 121.2 ± 2.6 **$T_{m,3}$ 223.6 ± 3.4**	$T_{c,1}$ 95.9 ± 0.4 $T_{c,2}$ 106.0 ± 0.2 $T_{c,3}$ 159.8 ± 11.9
PE pellet recommendation (RecyClass, 2021a)		-	< 0.5 g.10 min^{-1} delta to A.0	T_m < 150 °C No more than 2.5% of PP for A.50	
PE pellet recommendation (The Association of Plastic Recyclers, 2020)		< 0.996 $g.cm^{-3}$	< 0.75 g.10 min^{-1} 25% delta to A.0	T_m < 150 °C	
PP pellet recommendation (RecyClass, 2021b)		< 0.920 $g.cm^{-3}$	< 15% deviation in respect to A.0	No more than 2.5% of PE for A.50	

* mean ± standard deviation, 1 = LDPE/HDPE/LDPE; 2 = BOPP/BOPPmet/PP; 3 = PET/PETmet/LDPE; 4 = PET/BOPPmet/LDPE; A.0 = 100% control; A.25 = 75% control flake with 25% alternative material; A.50 = 50% control flake with 50% alternative material, ** T_m = melting temperature; T_c = crystallization temperature; ^{a,b,c,} the means, followed by the same letter, in the column compared to the respective A.0, do not differ at the 95% confidence level ($p < 0.05$).

3.2.3. Films

Mechanical properties and appearance

Table 5 shows the thickness, mechanical properties and appearance of the films in Appendices. The significant difference ($p < 0.05$) observed in the thickness values for recycled films **B.25** and **B.50** of the processing of alternative materials **2**, **3** and **4** is related to the number of incrustations on the surface of the materials, being more prominent in films with a higher percentage of recycled material (B.50). These films also have a rough surface appearance and large amount of gels and spots with dimension larger than 200 µm.

Gels and specks can weaken the film quality. RecyClass (2021a, b) protocols do not establish recommendation for amount of gels and specks but only mention they must be in accordance with the intended application. However, The Association of Plastic Recyclers (2020) protocol for PE films establish maximum number of defects no more than 25% count increase to **B.0**. Based on these criteria and using maximum number of defects equal to 35 (gels plus specks), **B.50** films from structures **2**, **3** and **4** indicate they are non-recyclable. **B.25** film from structure **3** also presented large amount of visual impurities.

Regarding mechanical properties, recycled films obtained from alternative structure **2** presented the greater change in performance according to evaluated parameters with reduction of values in tensile strength (DM and DT), elongation at break (DT), dart impact and tear strength (DM and DT). For tensile strength, only recycled films from structure **1**, made of just polyethylene, showed values according to protocols recommendations in both directions. If we consider the criteria of 25% deviation in relation to **B.0** only in the test of performance drop (The Association of Plastic Recyclers, 2020) all films from structure **1** are accepted in recycling PE lines which was expected because they are made of monomaterial.

Compatibilizers and inorganic fillers have the function of improving the homogeneity of materials (Horodytska et al., 2018, Tartakowski, 2010, Wyser et al., 2000), that is why they are usually employed for recycling multilayer films. Therefore, recycling multilayer films in polyolefins recycling lines without the use of compatibilizers is a huge challenge.

Despite the significant decline ($p < 0.05$) some mechanical properties of the recycled films as a whole, the films with a higher percentage of recycled material from alternative materials **3** and **4** showed good performance in terms of elongation at break and better performance for tear strength. These films have PET in their structures, which is responsible for their mechanical strength. These properties can be interesting for some applications.

According to ABNT NBR 14937-23 standard (2023, Brazil) which establishes the minimum quality parameters for plastic bags made of virgin HDPE resin, the requirements for mechanical properties are less stringent than the results for recycled films obtained in this study. For example, for plastic bags with capacity of up to 16 kg dart resistance is evaluated using 70 g weight, recycled films from structures **1**, **3** and **4** comply with this requirement.

Agricultural films are another interesting application for recycled films. Mulching films need to show high values of mechanical resistance in terms of tensile strength (> 20 MPa) and elongation at break (approx. 300%) to attend the requests imposed on their use. Recycled films **1** and **2 – B50** comply these parameters. Using adequate percentage of recycled material is possible to achieve these parameters in generating solutions for reusing of plastic waste (Briassoulis et al., 2004).

3.2.4. Total light transmission

Figure 1 shows total light transmission spectra from recycled films evaluated in this study.

Optical properties, in particular transparency, are important requirement for plastic materials. In the case of recycled films, it can be harmed by the presence of paints, metallization residues and incrustations resulting from the mixture of incompatible materials. The results in Figure 1 show that recycled **B.0** films have excellent light transmission for wavelength higher than 380 nm (visible range), reaching >85% transparency. Recycled films **B.25** and **B.50** obtained from alternative materials **1** and **2** show the best light transmission performance (> 75%) results in terms of the highest percentage of recycled material. Alternative material **1** is colorless while structure **2** is metallized, getting recycled films tinted gray. Structures **3** and **4** are printed and the color the recycled films were green and brown, respectively, reducing the transparency of the materials in the visible region (from 380 nm to 800 nm). Light barrier from 200 nm to 300 nm is characteristic to PET present in recycled films from structures **3** and **4**.

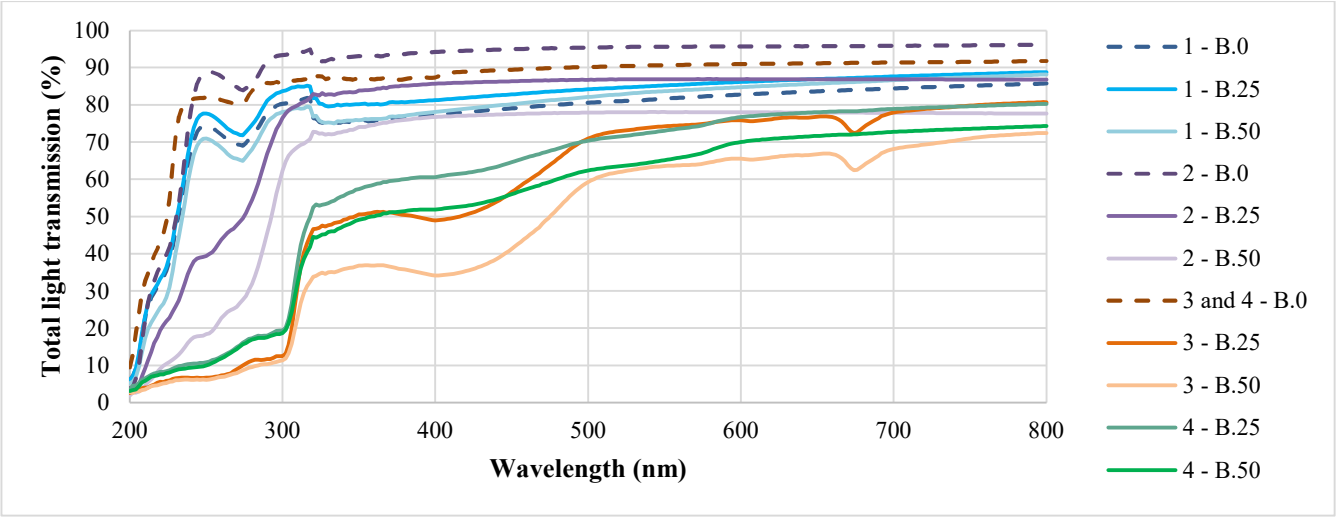

Figure 1. Total light transmission of recycled films: 1 = LDPE/HDPE/LDPE; 2 = BOPP/BOPPmet/PP; 3 = PET/PETmet/LDPE; 4 = PET/BOPPmet/LDPE, B.0 = 50% control pellet and 50% virgin pellet; B.25 = 50% A.25 pellet and 50% virgin pellet; B.50 = 50% A.50 pellet and 50% virgin pellet

3.2.5. Stereomicroscopy and Scanning electron microscopy (SEM)

Figure 2 shows stereomicroscopy and scanning electron micrograph for recycled films.

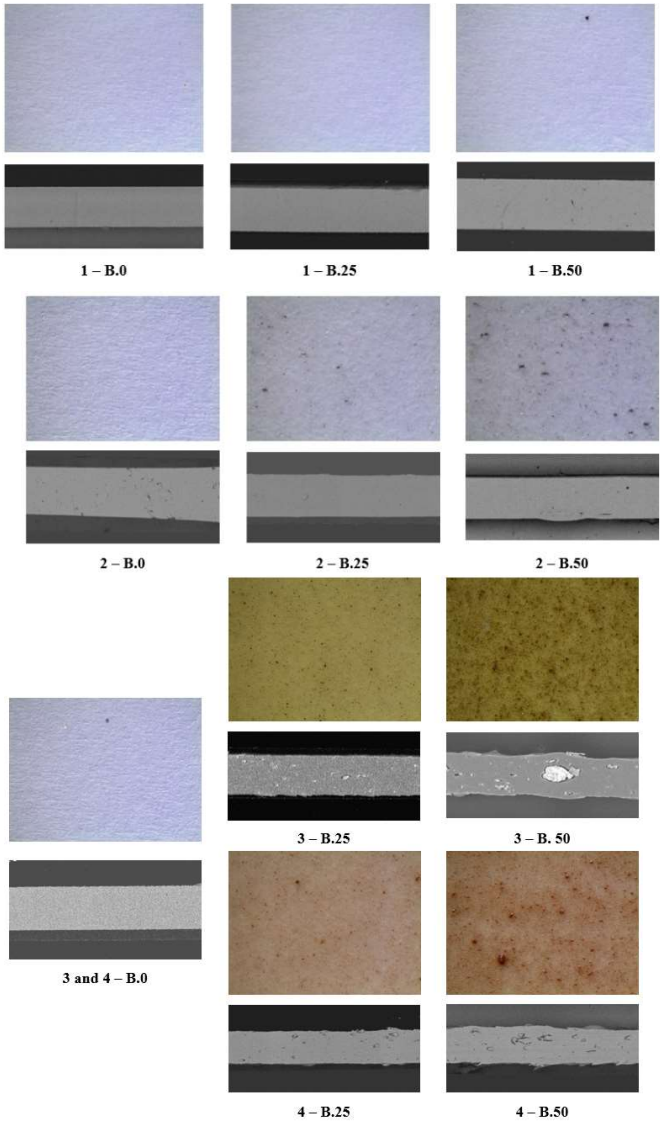

Figure 2. Stereomicroscopy and scanning electron microscopy (SEM) images of the recycled films (5 kV, 25 mm, 200x, scale: 100 µm): 1 = LDPE/HDPE/LDPE; 2 = BOPP/BOPPmet/PP; 3 = PET/PETmet/LDPE; 4 = PET/BOPPmet/LDPE, B.0 = 50% control pellet and 50% virgin pellet; B.25 = 50% A.25 pellet and 50% virgin pellet; B.50 = 50% A.50 pellet and 50% virgin pellet.

Results obtained in visual evaluation of the films appearance can be confirmed in the stereomicroscopy and electron microscopy images. **B.0** films have a flat surface while the recycled films, especially from structures **3** and **4**, have a rough surface. Roughness increases with the increase of the percentage of recycled material. Structure **1** is composed only by polyethylene and structure **2**, despite being multilayer and metallized, also is made up of a unique type of polymer (polypropylene) and after the recycling process, it becomes a homogeneous mixture. Alternative materials **3** and **4** are metallized and composed by a mixture of materials (PET, BOPP and LDPE), then reaching homogeneity is very difficult without adding modifiers. These results show that metallized BOPP is less critical to get homogeneity of the recycled films than metallized PET since films from structure **3** are more heterogeneous than structure **4**. Probably this heterogeneity is responsible for the lowest values of tensile strength of the recycled films **3 – B.50** and **4 – B.50**, as shown in Table 5.

3.3. Environmental profile

Changing the current structure of PET/Al foil/LDPE to any of the other four structures evaluated gets a reduction of the four environmental aspects evaluated as shown in Figure 3. In general, the alternative film options for the standup pouch have a lower environmental impact than the current film, which is mainly due to the elimination of aluminum foil from the structure of the films. The highest environmental impact values were obtained for the climate change (GWP), water depletion (WDP) and fossil depletion (FFP). Films **1** and **2** are recyclable since they are monomaterials (LDPE/HDPE/LDPE and BOPP/BOPP/PP, respectively). Therefore, a recycling rate of 23.4% was applied to the plastic waste generated by these films (ABIPLAST, 2022), which explains the lower environmental impact of these films compared to the current, **3** and **4** films, which are not recyclable.The higher environmental impacts reduction was obtained with the film of LDPE/HDPE/LDPE (structure **1**) that showed 0.19 kg $CO_{2\text{-eq}}$ m^{-2} of GWP, $8.64x10^{-5}$ PM2.5 m^{-2} of PMFP, $1.36x10^{-6}$ kg $P_{\text{-eq.}}$ m^{-2} of FEP, $7.09x10^{-4}$ kg $SO_{2\text{-eq.}}$ of TAP, 0.14 kg oil-eq. of FFP and $1.15x10^{-4}$ kg 1,4-$DB_{\text{-eq}}$ m^{-2} of FETP, which represents a reduction of 50%, 57%, 35%, 55%, 24% and 36% in relation to the structure of PET/Al foil/LDPE (current film), respectively.

The structure PET/BOPPmet/LDPE (structure **2**) showed the second-best reductions of the environmental impacts, with 0.28 kg $CO_{2\text{-eq}}$ m^{-2} of GWP, $1{,}23x10^{-4}$ PM2.5 m^{-2} of PMFP, and $1.02x10^{-3}$ kg $SO_{2\text{-eq.}}$ of TAP, representing a reduction of 29%, 39% and 36% in relation to the structure of PET/Al/LDPE (current film), respectively.

Figure 4 shows the contribution of the several materials to the impact category GWP. As can be seen, LDPE is the major contributor to GWP. With exception of structure **2** that is all PP-based, LDPE is the material with the higher content in the structure of the films explaining its major contribution to this impact category.

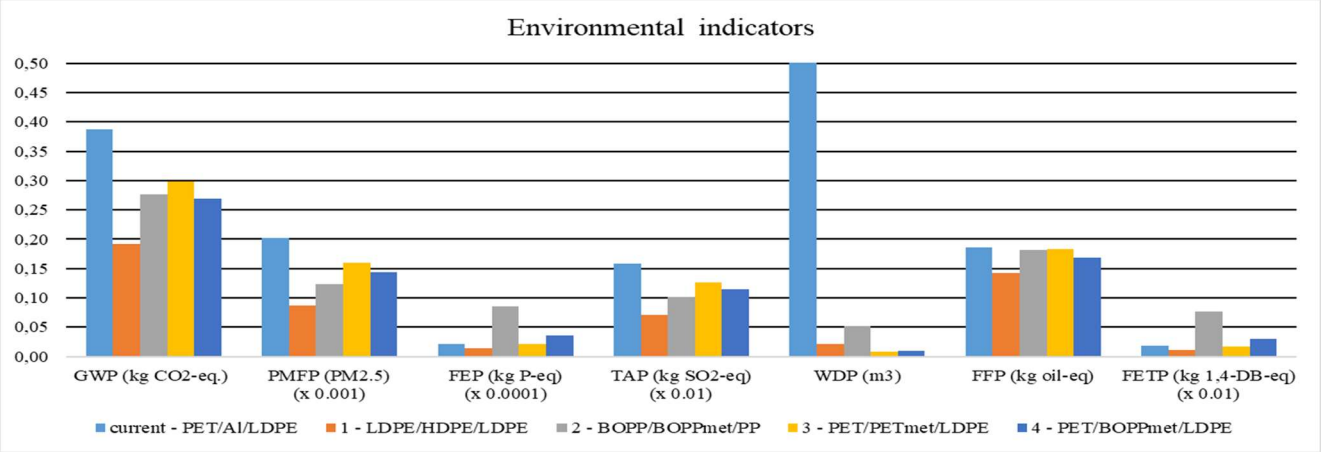

Figure 3. Environmental indicators of flexible plastic packaging for instant coffee. (Functional unit = 1 m^{-2}

As can be seen in Figure 4, aluminum has a large contribution (39%) to the impact category GWP. This is due to the production process of aluminum that demands a great amount of energy.

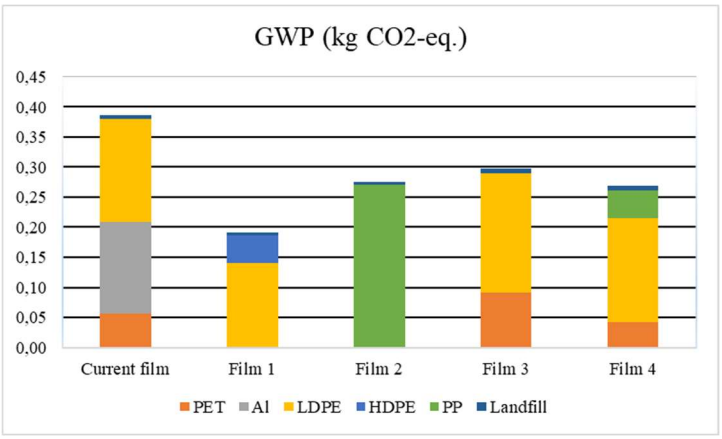

Figure 4. Contribution of the different materials to the impact category GWP.

4. Conclusions

Only alternative flexible plastic structure made exclusively by polyethylene (**1** = LDPE 33 µm/HDPE 33 µm/LDPE 32 µm) showed all pellet and film properties totally compatible with current established PE recycling lines according to the recycling protocols available. The good homogeneity of these recycled PE films was proven by appearance and transparence results. Although films from alternative materials **3** - PET 12 µm/PETmet 12 µm/LDPE 67 µm and **4** - PET 10 µm/BOPPmet 11 µm/LDPE 53 µm demonstrated incompatibility with PE recycling lines, they showed increase in important mechanical properties for using in some applications, such as high tensile and tear strength. Recycled films obtained from alternative materials **1**, **3** and **4** could be used for manufacture of plastic bags, and film **2** - BOPP/BOPPmet/PP – B.25 could be used as agricultural films. It is known that polyolefin recycling lines are well consolidated and functional processes. However, it is suggested to study the possibility of carrying out some changes in these processing lines so that multilayer flexible plastic materials can be incorporated considering the environmental gain that will be achieved, besides alignment with the circular economy. Regarding the environmental performance, the higher reduction of the environmental aspects evaluated in this study was also achieve with the adoption of structure **1** for packing instant coffee (50% less GWP, 57% less PMFP, 35% less FEP, 55% less TAP, 99% less WDP, 24% less FFP and 36% less FETP) in relation to the structure of PET/Al foil/LDPE (current film), followed by structure **4**. Therefore, based on the aspects evaluated in this study it is suggested the adoption of structure **1** for instant coffee in flexible packaging as a recyclable and lower environmental impact alternative in accordance with the goals of the circular economy.

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Hong Kong's ETF Framework for Enabling Investment in Islamic Compliant Corporations – An Analysis of Its Impact on Middle Eastern Investments

Hong Kong'un İslami Uyumlu Şirketlere Yatırımı Etkinleştirmeye Yönelik ETF Çerçevesi - Orta Doğu Yatırımları Üzerindeki Etkisinin Bir Analizi

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ANAHTAR KELİMELER

ETF
Hong Kong
Düzenlemeler
İslami finans
Orta Doğu

ÖZ

Çin önemli bir dönüşüm geçirmiş ve Orta Doğu ile artan işbirliği ve angajman örnek olarak gösterilmiştir. Finansal yatırımlar ve her iki finans piyasasının erişilebilirliğinin artması, karşılıklı angajman için bir köşe taşı teşkil etmiştir. Artan etkileşim ve karşılıklı yatırımların çekilmesine odaklanılmasıyla birlikte, Hong Kong'un Suudi Arabistan'a finansal sürdürülebilirliğe katkı potansiyeli olan ETF yatırımları için önemli bir ticaret merkezi olarak kurulması ve hem Hong Kong'daki hem de Çin anakarasındaki yatırımcıların Suudi Arabistan hisse senetlerine yatırım yapabilmeleri konusunda güçlü bir ivme oluşmuştur. Suudi Arabistan finansal sisteminin önemli bir bileşeni, tüm finansal değer zinciri boyunca Şeriat uyumluluğuna güçlü bir şekilde odaklanmasıdır ve bu, Suudi Arabistan hisse senetlerine yatırım için temel bir özelliği temsil etmektedir. Suudi Arabistan'da ETF türevi yatırım fırsatları sunan Hong Kong'un artan ilgisiyle birlikte, hem Hong Kong içinde hem de ETF Çin bağlantısı aracılığıyla yapılan tekliflerle ilgili düzenleyici sorular ortaya çıkmaktadır. ETF Çin bağlantısı aracılığıyla işlem görmesine izin verilen varlık türleri ve koşullar açısından hala kısıtlamalar olsa da, genel olarak Hong Kong'da listelenen Suudi Arabistan ETF'lerinin Çin anakara piyasasında sunulmasına hak kazandıracaktır.

KEYWORDS

ETF
Hong Kong
Regulations
Islamic Finance
Middle East

ABSTRACT

China has undergone a significant transformation and the growing engagement with the Middle East has been exemplified in the growing collaboration and engagement. Financial investments and the enhanced accessibility of both financial markets have represented a cornerstone for mutual engagement. With the growing engagement and focus on attracting mutual investments, there has been a strong impetus in establishing Hong Kong as a major trading center for ETF investments with potential to contribute to financial sustainability into Saudi Arabia and enable both investors in Hong Kong and mainland China to invest into Saudi Arabian equities. A crucial component of the Saudi Arabian financial system is its strong focus on Shariah compliance across the entire financial value chain and this represents a key characteristic for investment in Saudi Arabian equities. With the growing interest of Hong Kong providing ETF derived investment opportunities in Saudi Arabia, regulatory questions arise related to both the offering within Hong Kong as well as via the ETF China connect. While there are still restrictions in terms of the types of assets and conditions that are permitted to be traded via the ETF China connect, it would generally qualify Saudi Arabian ETFs that are listed in Hong Kong to be offered in the mainland Chinese market.

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1. Introduction

Saudi Arabia and China has undergone significant changes with a massive increase in investments between the two countries. Hong Kong has aimed at attracting new investors to its capital market and enable it to become an intermediary between China and Saudi Arabia. Given Chinese's governments strong suggestion on enhancing ties with the Middle East. The Hong Kong Exchanges and Clearing (HKEX) established an exchange-traded fund that follows Saudi Arabian stocks and initiated a cooperation agreement with Tadawul, the country's stock market operator. Among other recommendations made by a Hong Kong government task committee tasked with enhancing the stock market in the territory is a drive to draw in initial public offerings from Middle Eastern businesses in order to enhance liquidity levels and make the market more attractive (Guo, Wang, & Fan, 2022).

One of the first exchange-traded fund (ETF) tracking Saudi stocks debuted in Hong Kong, which is managed by CSOP Asset Management, a Hong Kong-based company, and is known as the CSOP Saudi Arabia ETF (2830.HK). Public Investment Fund (PIF), a Saudi sovereign wealth fund, is one of its anchor investors.

The fund mimics the performance of the FTSE Saudi Arabia Index, which at the end of October had 56 components with a combined market value of $276.8 billion. In the last three years, the index returned 45.3%, and the investors will be able to trade Saudi equities in Hong Kong dollars or Chinese yuan. With the growing investment in Saudi Arabia, Islamic finance becomes a major essential part in ensuring that the offered investment products support the investor base. With the growing engagement of Asian investors with the Middle East, in particular Saudi Arabia, Islamic finance will assume an even greater role in order to ensure alignment with their societal values and solid investment. Given the growing attractiveness of Exchange Traded Funds that enable investors to invest into these markets without any direct exposure or the ability to directly invest into these markets. ETFs can make significant contributions to financial sustainability. The basis for this is the benefits that ETFs can provide (investment diversification, accessibility, liquidity, transparency, cost effectiveness, etc.).

In this article, we will analyze the impact of ETF regulations in Hong Kong on investments in Saudi Arabia and the arising regulatory requirements related to Shariah compliant investments. Furthermore, we will investigate the ETF China connect, and the regulatory requirements when offering Shariah compliant ETFs for mainland China investors.

2. ETF regulations in Hong Kong

ETF regulations assume a significant role in Hong Kong with the Hong Kong government striving to become a major international ETF gateway for the industry. The Hong Kong Government's Tracker Fund of Hong Kong is the most widely traded ETF in the city and represented a cornerstone upon its introduction in 1999 for the entire ETF environment. Most of the ETFs that are actively traded within the city are based on stock, RQFII (Renminbi qualified foreign institutional investors A-share, and synthetic A-share ETFs. Additionally, more and more foreign ETF fund managers have listed in Hong Kong in recent years in order to access the market and offer their services. ETFs that are listed on the HKSE are generally open-ended, passively managed funds that mimic or follow the performance of an underlying index (Hwang, 2010). The index may be based on bonds, commodities, stock markets, or a subset of equities of stock markets. However, some Hong Kong-listed exchange-traded funds (ETFs) track the performance of a single commodity, such as gold, and provide investors with an effective means of gaining inexpensive exposure to the underlying assets. The main form for these investors is access these ETFs via their brokers. With the growing importance of a more diverse investment spectrum, a significant number of new ETFs, including leveraged and inverse products following US, Japanese, and South Korean benchmarks, as well as products tracking crude oil futures were introduced, and also the 2010s experienced the creation of the first ETF that tracked the real estate market (Abraham, 2007).

The ETFs that are listed on the HKSE are that most of them track benchmarks. This implies that the management of the funds is passively and mostly follow the performance of the benchmarks they are covering. Another key characteristic is transparency, and the ETF have disclosure requirements such as outlining the underlying benchmark, the net asset value (NAV) of the fund, and further compliance related information such as ownership and contact information. Pricing of the ETF, both in terms of intraday quotes and delayed price quotations play another important role (Chen, Liu, & Zeng, 2017).

Additionally, ETF have typically minimal transaction costs, which represent the conventional fees such as broker commissions, transaction levies and trading fees in case they are charged. However, ETF do not charge a subscription fee. Furthermore, the ETF investment is typically kept to a minimum in terms of its minimal requirements. A crucial part of the ETF is that liquidity has to be maintained during the trading hours, which requires market makers that provide such liquidity. Finally, the trades are settled conventionally on a T+2 basis, which is the same as for shares trading (Jares & Lavin, 2004).

The ETFs listed on the HKSE are either synthetic or physical, and full physical replication implies that the ETF replicates the underlying index via the investment in the components of the index. The quantities shall be approximately in the same quantities as the index. The ETF represents a high degree of correlation with the underlying index, and in the case the portfolio has the same characteristics as the index, then representative sampling is utilized in order to integrate some stocks in the portfolio that are not index constituents. Synthetic exchange traded funds invest in financial derivates instead of the components of the

index, but it requires them still to have collaterals. Furthermore, the net risk exposure to a single counterparty has to be less than 10 % of the NAV (Cheng, Massa, & Zhang, 2019).

Under section 104 of the Securities and Futures Ordinance (SFO), ETFs must apply to the Securities and Futures Commission (SFC) for authorization as collective investment schemes (CIS) and to the HKSE for listing under Chapter 20 of the HKSE's Rules Governing the Listing of Securities. These are also called the Listing Rules. Previously, an application for SFC authorization had to be lodged first, and an official listing application for the ETF was then submitted to the HKSE following an approval in principle from the SFC.

The CIS must simultaneously file an application for authorization with the SFC and publish an Application Proof of its listing document on the HKSE website if a new CIS applicant has appointed a listing agent who is required to carry out the duties equivalent to those of a sponsor. These are encountered in paragraph 9 of Practice Note 22 to the Listing Rules and play a critical role for the listing process. Upon receipt of an acceptance in principle letter from the SFC along with a request to post a Post Hearing Information Pack (PHIP), this must be submitted for publication on the Exchange's website, which is listed in paragraph 12 of Practice Note 22 to the Listing Rules. The applications for CIS authorization must be submitted using the filled-out application form and information checklist found on the SFC website. Additional documents that the SFC may occasionally request also include the product key facts statement (KFS) and scheme offering and constitutive documents, as well as the application fee, which should be paid to the SFC by check (Chen & Xu, 2023). Furthermore, a written undertaking from the Hong Kong Representative in the case of non-Hong Kong-based schemes, meaning the management company is not incorporated or does not have a place of business in Hong Kong. Finally, a letter designating an individual to be approved by the SFC as an approved person has to be submitted. This serves the purpose of servicing notices and decisions relating to the scheme, advertisements and documents. This letter should include the individual's name, employer, position held, and contact details, including the address, phone number, and email address (Hong Kong Exchange, 2023).

Authorization plays a key role and there are several prerequisites. For the CIS to issue the authorization, several criteria have to be fulfilled. First, they have to designate a trustee or custodian who is independent of the management company and acceptable to the SFC. This can be a licensed bank, registered trust company, or banking institution/trust company incorporated outside of Hong Kong acceptable to the SFC. They must, among other things, register cash and registrable assets, take custody and control of scheme property on trust for holders and make sure that unit sales, redemptions, and cancellations are executed in accordance with the documents (Tao, 1999).

Furthermore, they have to issue reports to holders for inclusion in the annual report, and the fiduciary has the requirement to be overseen by the regulators and provide recurrent reviews of the internal systems and controls. If a current review is not adequate, then an independent audit may be performed. Additionally, the fiduciary has to possess non-distributable capital reserves and the minimum issues as well as a paid-up capital of 10 million Hong Kong Dollar. This may be also in an equivalent currency. The fiduciary also has the responsibility to designate a fund management that is on the approved list of the SFC. The company takes on responsibility for the management of CIS and has to keep accurate books and records, as well as prepare the reports and accounts. There is an exception if the fund is managed by a board of directors that do not deal with the CIS as principals and that can be removed by holders. The management enterprise has to be primarily focused on fund management business, and the sufficient financial, human and technical resources to conduct business. They have a minimum issued and a paid-up capital and capital reserves of more than 1 million Hong Kong Dollars. The fund has to ensure that it does not lend to a material extent and maintain positive net asset positions at all point in times. Finally, they need to have both directors, investment advisors and key personnel with adequate reputation and proper qualifications. Finally, the fund is required to release up-to-date offering documents in both Chinese and English, and the document has to contain information for investors in order to be able to evaluate the investment offered to them. A non-exhaustive list of the offering document components is found in the Appendix C of the code and focuses on the constitutive documents, as well as the investment objectives and restrictions. Furthermore, collateral policy and criteria as well as the property valuation and pricing, in addition to liquidity risk management (Hong Kong Exchange, 2023).

For the offering of index funds, there are certain additional requirements that have to be maintained related to the index. Specifically, the index needs to focus on a specific market, industry or sector of an economy that is well defined. The index also needs to have a wide base of holdings, requiring that a single constituent should not weigh more than 20 % of the index and there should be a sufficient composition. Finally, the index has to be investible, and components need to be able to have sufficient liquidity. The indices should be publishing information about the composition and there has to be transparency in the way the index is calculated. The index also needs to follow rules and achieve objective calculation. If there is an impact on the index’s acceptance, then this has to be discussed with the SFC. The index provider needs to have technical resources and the experience in order to create, update and review the index’s rules as well as methodology. This requires that the procedures and guidelines are both transparent and standardized, as well as recorded (Securities and Futures Commission, 2023).

There are several restrictions that do not apply to index funds, and which cap the CIS holding of securities of single

issuer to no more than 10 % of the net asset value of the fund. In the case of the ETF's holding of the constituent securities do not exceed the index's weighting, and the constituent securities account for more than 10 %, then more than 10 % of the Nav may be invested into securities by a single issuer.

In the case the ETF utilizes a representative sampling technique, then they may hold constituent securities above the respective weightings in the index. There is a maximum that may be reached but this is in conjunction with the assessment with the SFC. The ETF has to provide information on the maximum limit in its offering documents, and this has to be disclosed in the ETFs interim and annual reports.

With respect to the name of the ETF, the terms related to index, tracking and tracker may appear in it. The ETF also requires extra disclosures that include the offering document's description of the market or sector of the index, and the index's general characteristics and compositions. This includes the concentration in economic sectors and the weightings of the top 10 largest index constituent securities. Furthermore, the fund has to outline that they will never exactly replicate the performance of the index, and outline situations in which the tracking may not be adequately performed. Furthermore, the ETF also has to indicate licensing requirements, such as indemnity payments to the index provider if necessary.

There are various other factors such as the ongoing disclosure requirements that the funds have to meet. The SFC has to be consulted before any proposed modifications, especially as it relates to constitutive documents, trustees, management companies and other investment objectives. If there are changes that the SFC requires consultation before any modifications, then the SFC will decide on how long the notification period will be and the management is required to give holders reasonable notice of any impending changes. The authorization may be withdrawn provided that it is presented to the SFC and approved prior to it. In the case that the fund has to wind down, or is merged with another fund, then the investors have to be given advanced notice well in advance. In doing so, the fund has to adhere to the SFC guidelines.

With respect to report, the fund is required to release a minimum of two reports every fiscal year. These interim reports have to be published and distributed with at most a two-month delay after the coverage period ended. For annual reporting, a maximum delay of four months is permitted.

Furthermore, the redemption prices or net asset value has to be disclosed on each transaction day, and this needs to be continuously performed. The financial reports have to be authorized by the SFC prior to reporting. When distinguishing between physical and synthetic ETFs, the synthetic ETF is required to have a name that starts with an x. Whenever the fund utilizes a synthetic ETF structure, then there has to be no relationship between the issuer of financial derivative instruments and the ETF management business. A crucial part is that the ETF has to provide collateral in order to reduce the counterparty risk exposure to no more than 10 % of the net asset value.

The ETF trustee in this instance has to hold the collateral and it has to be easily available as well as enforceable without the requirement of additional action by the issuer of the financial derivatives. The net and gross counterparty exposure has to be disclosed publicly. If the ETF invests into domestic market, then the collateral has to be at least 100 % to guarantee the use of financial derivatives to mimic the index performance. Additionally, if the equity assets are utilized as a collateral, then the market value has to be at least 120 % of the gross counterparty risk exposure.

For any listing on the HKSE, the application requires to submit a non-refundable deposit of 20,000 Hong Kong Dollars as the first listing charge. The formal application for listing may be also solely after the SFC verified the application.

A crucial part of the application is the availability of a qualified agent that assist in the handling of the listing process and ensures that it is complete timely and in an organized fashion. Another crucial requirement is that the securities have to be approved by the Hong Kong Securities Clearing Company Limited (HKSCC) for settlement and clearing.

The SFC requires liquidity for its ETF in order to list on the exchange. Hence, it requires a single market maker or a Securities Market Maker (SMM). While there are tick rules, that allows short selling below the current ask price, these may be waived for the ETF by the HKSE before the launch day. The Hong Kong stamp tax is not applied for the sale or transfer of shares or units of ETFs that are listed in Hong Kong and have a local records holder. This is based due to a Stamp Duty Amendment Ordinance in 2015 that extended the waiver to ETFs and that track an index that includes more than 40 % of Hong Kong stocks.

Hong Kong has a strict stock code allocation regiment, and these are within the range of 2800-2849 and 3000-3199. The only exception are the RMB-ETFs. The ETF managers have the voting option for a stock code as well as can select the preferred stock code via dedicated payment. Before the listing of the ETF, the manager of the ETF has to submit an application to be admitted as a qualified security for the deposit, clearing and settlement.

The next critical area is for ETFs that are established or redeemed outside of CCASS. The HK Conversion Agency Services Limited (HKCAS), which is a wholly owned subsidiary of Hong Kong Securities Clearing company Limited (HKSCC), may represent the service agent in order to allocate the deposits or withdraw the ETF units into or out of the CCASS. For this purpose, the ETF management, trustee, registrar and any participating dealers have to sign the service agreement.

3. ETF China Connect

In regard to an in-principle agreement between the CSRC and the SFC regarding the inclusion of eligible exchange-traded funds (ETFs) by Mainland Chinese and Hong Kong exchanges in the Mainland-Hong Kong Stock Connect arrangement (ET F Connect), the China Securities Regulatory Commission (CSRC) and the Securities and Futures Commission of Hong Kong (SFC) released a regular review document on the inclusion of ETFs in the Stock Connect. This inclusion for the northbound trading via the Mainland Hong Kong Stock Connect represents a critical connection for mainland investors to invest in Hong Kong stocks and ETFs and access stocks outside the mainland market. The ETF Connect is part of two separate stock connects that consist of the Shanghai-Hong Kong Stock Connect and the Shenzhen-Hong Kong Connect that were introduced in both 2014 and 2016. The connects enable mutual market access and increases liquidity across the entire Chinese stock and ETF market. The Stock Exchange of Hong Kong Limited (SEHK), Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE) make up the stock connects and before the launch of the stock connects, investors from Hong Kong had to rely on Renminbi Qualified Foreign Institutional Investors and Qualified Foreign Institutional Investors regimes (QFI regime) to trade individual mainland Chinese stocks.

The main parties in the creation of the stock connect were the CSRC and the SFC that aims to facilitate market access between mainland China and Hong Kong. An additional factor is the internationalization of the Renminbi (RMB), with Hong Kong acting as the offshore hub for the RMB transactions. Trading utilizing the stock connect has been significant with both southbound and northbound trading experiencing significant increases. The ETF connect represents another major milestone to include ETFs under the mutual market access program.

ETFs listed on the SSE, SZSE, or SEHK must meet several requirements, including those related to fund size and index constituents, in order to be qualified for inclusion via ET F Connect. Depending on whether the ET F in question is going to be traded northward or southward, different restrictions apply.

The following inclusion requirements must be met for Hong Kong ETFs that are listed on the SEHK and principally governed by the SFC to be approved as qualified ETFs for "Southbound trading," or trading via ETF Connect out of Mainland China. It should be highlighted that an eligible ETF of this type must be principally listed on the SEHK, which implies it must have its domicile in Hong Kong and be managed by a fund manager regulated by the SFC and based in Hong Kong. Therefore, southbound trading will not be permitted for cross-listed ETFs on the SEHK. Additionally, there are quite stringent eligibility conditions, particularly regarding the weighting of constituents in the applicable benchmark indices.

Leveraged and inverse products, as well as synthetic ETFs, are not accepted for the ETF stock connect, and the ETF must trade in terms of Hong Kong Dollars in order to be acceptable. Another requirement for the ETFs to trade is that in the preceding six months, the daily average AUM has to be at least 0.7 billion Hong Kong Dollars, and the ETF has to be listed for a minimum of six months. The current requirements also indicate that the ETF benchmark index had to be introduced for a minimum of one year, in addition to 90 % of the weighting of the equities have to be listed in Southeast Asia. In the Hang Seng Hong Kong-Listed Biotech Index (HSHKBIO), Hang Seng China Enterprises Index (HSCEI), Hang Seng TECH Index (HSTECH), and Hang Seng Index (HSI), the total weighting of Stock Connect qualified members must be at least 70%. At least 80% of the overall weighting of Stock Connect qualifying constituents must be included in other benchmark indexes as per the requirement.

There are several requirements related to constituent stocks that have to be adhered for in the listing. For example, in broad-based indices, a member stock cannot account for more than 30% of the weighting of the relevant index. This bears resemblance to the pertinent provisions of the SFC's Code on Unit Trusts and Mutual Funds (UT Code), which prohibits the SFC from accepting an index that has few constituent stocks or a single constituent asset that weighs more than 20%. If any of the following exclusion criteria apply to any of the ETFs that meet the inclusion requirements, they will become "sell-only" securities and will be restricted from being purchased (Yang & Chi, 2023).

There are several exclusion standards, such as if an ETF transforms into a leverage and inverse product, as well as synthetic ETFs. Additionally, if the ETF’s daily average AUM is less than 0.2 billion Hong Kong Dollar, it has to be excluded as well.

In HSI, HSCEI, HSTECH, and HSHKBIO, the overall weighting of Stock Connect qualified constituents is less than 65%. The overall weighting of Stock Connect qualifying constituents for other benchmark indexes is less than 70%. There are several requirements related to constituent stocks. For example, when it comes to broad-based indexes, the exclusion criterion is satisfied when a constituent stock accounts for more than 30% of the weighting of the relevant index (Marszk, et al., 2019).

Northbound ETFs

For any northbound ETFs transactions, several requirements have to be met. A northbound trading implies that the trade is performed with the location of Hong Kong via the ETF connect, and the stocks have to be sufficiently liquid. This implies that the daily average AUM had to be at least 0.5 billion Renminbi. If the ETF is connected to a benchmark index, then the ETF benchmark index has to be launched at least for a year. However, SSE-listed and SZSE-listed A-shares have to make up 90 % of the benchmark index’s total weighting. Also, 80 % of the benchmark index is made up

of qualifying members of the stock connect. The constituent stocks also need to ensure that a single member stock cannot assume more than 30% of the index's weighting.

In the case of an ETF not meeting anymore the inclusion requirements, the ETF will become sell-only and will experience purchase restrictions after review by the SEHK. The threshold may be lowered to 30 % when the index is considered to be a broad-based index. For an ETF to qualify for the northbound connect, the ETF has to be exchange on the exchange or via a secondary market. Similar to the existing stock connect, the ETF connect has a daily limit on the trading volume of the ETF. All of the stock connects experience daily quotas for both the northbound and southbound trading. When it comes to marketing ETFs, then the Securities and Futures Ordinance primarily governs this area, and any marketing has to authorized by the SFC.

Regarding listed securities, section 103(ii) of the SFO qualifies this section by stating that it does not apply to anything done by any person in relation to any interest in a collective investment scheme that is not authorized by the SFC, even though the section regarding advertisement mentioned above does not apply to the issuance of an advertisement, invitation, or document made by or on behalf of an intermediary licensed or registered for Type I, Type 4 or Type 6 regulated activity.

As a result, while professional investors may be approached about collective investment schemes like ET Fs without the need for SFC authorization, the SFC will only, in actuality, allow the public promotion of ETFs and other collective investment schemes that it has approved.

Thus, the same rules that apply to collective investment schemes generally will also apply to any marketing of qualifying Mainland Chinese ETFs under ETF Connect in Hong Kong. It is probable that such Mainland Chinese ETFs will need to be authorized by the SFC before they may be openly promoted in Hong Kong, even though the SFC has not yet addressed the regulations in this regard.

Note that under the UT Code, a relevant ETF may be authorized by the SFC as an index fund since Mainland Chinese ETFs eligible for inclusion under ETF Connect are passive index-tracking ETFs. Furthermore, physical index-tracking ETFs are eligible for MRF benefits under the mutual recognition of funds (MRF) agreement that has been in effect between Mainland China and Hong Kong since May 2015.

As a result, if the necessary conditions are satisfied, applications for authorization from the SFC from these Mainland Chinese ETFs may be handled like regular applications. In summary, despite ETF Connect, only SFC-approved eligible Mainland Chinese ETFs will be permitted to be publicly marketed in Hong Kong rather than only being accessible for trading through ETF Connect. This is regardless of whether the ETFs are registered on the SEHK or not.

If SSE or SZSE stocks are delisted due to the applicable mandatory delisting conditions, no delisting arrangement periods are applied to the existing Stock Connect securities. Nonetheless, a delisting arrangement term of 15 trading days applies to equities that are forcibly delisted for other reasons.

There are currently no delisting arrangement periods for ETFs eligible for northbound trading under the ETF Connect schemes. This means that if an eligible Mainland Chinese ETF is delisted from the SSE or the SZSE, it will be removed from the eligible ETF list as of the date on which new buy and sell orders for the delisted ETFs will not be accepted.

The SEHK may also delist an issuer immediately in appropriate circumstances or publish a delisting notice stating the SEHK's right to delist an issuer if the issuer fails to resume trading within the notice's specified period.

For an eligible ETFs to be formally added to Stock Connect, several conditions have to be met. The first is that all regulatory approvals must have been fulfilled, and that the trading and clearing rules and systems must have been finalized. Furthermore, market participants must have sufficiently adapted their operational and technical systems and have all necessary arrangements for cross-border regulatory and enforcement cooperation must be made. Finally, the investor education measures have to be addressed and arranged.

In contrast to earlier initiatives at financial integration between Hong Kong and the GBA, including the Cross-Listing Scheme, ETF Connect offers issuers a more affordable means of cross-border distribution of their ETFs. Because ETFs have minimal trading fees, ETF Connect encourages more people to make international investments and increase the liquidity of key ETF markets.

Since that different technology equities cannot be exchanged under the current Stock Connect program, the establishment of ETF Connect may permit additional trading of technology assets through investments in relevant ETFs.

Potential participants may be discouraged by the list of restrictions on operating procedures and thresholds related to qualified ETFs. Like other market mutual access programs, the range of investment options offered by ETF Connect may determine whether the launch of ETF Connect can attract significant interest and funding. Even while the SFC acknowledges that ETF Connect has a limited scope, if the pertinent qualifying restrictions are loosened, the program might become more popular amongst investors. The ETF connect has several benefits. In addition to offering a wider range of investment products than Stock Connect, ETF Connect is anticipated to significantly increase market connectivity between Mainland China and Hong Kong. Though ETF Connect shares many of the same essential features as Stock Connect's A-share trading, its stringent ETF eligibility requirements may deter many investors from using it.

Furthermore, until the Mainland Chinese ETFs are separately authorized by the SFC under MRF, the promotion of Mainland Chinese ETFs that qualify via ETF Connect in Hong Kong will be restricted by the regulatory framework under the SFO for marketing collective investment schemes.

4. Islamic compliant foreign investment in Saudi Arabia

Saudi Arabia has undergone some significant changes in the recent years, enabling foreign investors to more easily invest into the economy. Foreign investors, that are non-resident, may invest into Saudi securities in various forms. The first is if the investor qualifies as a foreign investor under the Rules of Qualified Foreign Financial Institutions Investment. This permits the investor to invest in the listed securities as an ultimate beneficiary in swap arrangements. Another permission is the investment in listed company equity in the form of a foreign strategic investor. These investments are conducted under the Guidelines for the Ownership of Foreign Strategic Investors in Listed Companies. If the investor qualifies as a direct investor, then the investments may not only be in investment funds but also in debt instruments and parallel market instruments (Albassam, 2015).

Within the parallel market, the categories of non-resident foreign investors eligible investments are not restricted, but there may be restrictions in the main market with respect to IPO investment participation unless they are explicitly permitted.

There are various classification regimes for non-resident foreign investors in the primary and secondary market. The first one is an investor that qualifies as a foreign investor under the rules of Qualified Foreign Financial Institutions Investment in Listed Securities. The investor must submit an application to the capital market institution that was granted a license by the Capital Market Authority. The capital market institution is required to conduct the custody and dealing with the investment activities. These investors may be financial institutions, securities and brokerage houses, insurance providers, government entities, investment funds, and authorities that are deemed qualified. The Financial Action Task Force (FATF) issues the respective regulations and standards for the monitoring of the financial institutions that may be located in non-compliant or non-cooperative countries without the contradiction of the relevant laws within Saudi Arabia (Alawi, 2019).

Affiliates of e-qualified overseas investors are allowed to make investments in the capital markets without the submission of a separate application. In order to determine whether a foreign investor qualifies as a qualified foreign investor, the capital market institution will perform the foreign investor assessment. Upon the acceptance of the qualifying application, the investor may purchase the listed shares subject to the investment limitations. These limitations are focused on any shares that are listed or are convertible debt instruments of the issuer and may not be owned by more than 10 % of a qualified foreign investor. Any foreign investor may own a maximum of 49 % of the shares that are listed or are in the form of convertible debt instruments.

In case the non-resident foreign investor does not meet the qualifications for the investment in listed securities may invest swap agreements via one of the licensed capital market institutions (CMA, 2023).

Another form of qualification is as a strategic foreign investor that permits to invest in listed businesses that permit strategic shareholdings. This is irrespective of whether they are financial or non-financial institutions, and the investment does not face any minimum or maximum amount restrictions. However, the strategic investor is not permitted to sell any shares acquired within the preceding two years. The foreign strategic investor has to establish a location or obtain a license in a nation that adheres to the Financial Action Task Force's (FATF) guidelines for anti-money laundering and counterterrorism financing or any authority that has to be approved. The approved nations have to be members of the International Organization of Securities Commissions (IOSCO) and apply sufficient regulatory and supervisory measures (CMA, 2023).

Direct investments differ from other investment funds. Non-resident foreign investors have to open an investment account at a capital market institution, and then the investor has to complete subscription and redemption forms. Debt market instruments are separate from equity investments, and non-resident foreign investors are able to participate in all kinds of debt market instruments with an opened account (Bajaher, Habbash, & Alborr, 2022).

The Vision 2030 has been a major driver for the enhancement of Islamic finance options within Saudi Arabia, an in 2021 the first commodity exchange-traded fund that is Shariah compliant was launched. The new ETF fund by Albilad holds 95 % of the assets in gold and this introduction has been a major impetus for enhancing market liquidity and transparency in the sector. The ETF arose as a collaboration between the Dubai Gold and Commodities Exchange (DGCX) and the Albilad Capital group.

5. Conclusion

There is significant engagement between Islamic world and China, with Hong Kong being a major gateway between these economies. Saudi Arabia has been a major emerging economy in recent years with the Vision 2030 actively promoting investment into the economy. With the growing engagement and focus on attracting mutual investments, there has been a strong impetus in establishing Hong Kong as a major trading center for ETF investments into Saudi Arabia and enable both investors in Hong Kong and mainland China to invest into Saudi Arabian equities. Thus, the possibility of ETFs contributing to financial sustainability emerged. A crucial component of the Saudi Arabian financial system is its strong focus on Shariah

compliance across the entire financial value chain and this represents a key characteristic for investment in Saudi Arabian equities. With the growing interest of Hong Kong providing ETF derived investment opportunities in Saudi Arabia, regulatory questions arise related to both the offering within Hong Kong as well as via the ETF China connect. ETF regulations have significantly been broader in enabling investments across the world and offering it to investors in Hong Kong. The ETF regulations also permit investments into Shariah compliant companies, given that the regulations should actively promote the investments in non-speculative enterprises with a solid business, which actively supports Shariah compliant investments. Additionally, the establishment of the ETF China connect permits these ETF to be also traded within mainland China, thereby increasing general investor acceptance. While there are still restrictions in terms of the types of assets and conditions that are permitted to be traded via the ETF China connect, it would generally qualify Saudi Arabian ETFs that are listed in Hong Kong to be offered in the mainland Chinese market. Policy enhancements towards the enabling of Islamic finance on a much broader scale would significantly benefit financial markets in both countries.

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