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Уміщено результати досліджень провідних фахівців, науковців, здобувачів наукових ступенів і звань із питань сучасного формування та розвитку теоретико-методологічних положень менеджменту, інноваційного розвитку країн світової економіки в умовах глобалізації, розвитку міжнародної інноваційної діяльності та науково-технологічного обміну, менеджменту й маркетингу наукових досліджень, корпоративного керування.

Для науково-педагогічних працівників, науковців, аспірантів і студентів, широкого загалу читачів, яких цікавлять питання менеджменту.

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Ви можете дізнатися вартість передплати на журнал, звернувшись до відповідального секретаря редакційної колегії І.Ю. Приварникової за адресою European.jmi@gmail.com та ознайомитись з інформацією на сайті www.mi-dnu.dp.ua. Запрошуємо до співробітництва.

INSTEAD OF A FOREWORD: WILL COVID-19 INCREASE THE HOMOGENEITY ISSUES?

Dear readers of our Journal!

In the foreword to the current issue, I would like to share with you an interesting thought which may have an impact on the research in all other academic journals all over the world. COVID-19 has been a topic dominating recent publications. Indeed, the pandemic changed the way we think about our world. Scholars from different fields started researching COVID-19 in all possible spheres of its impact. This text is dedicated not to the research of COVID-19, however.

I would like you to imagine in how much the pandemic influenced our lives: we changed the way we interact, the way we perceive regular work, management, and organisations, and the way we collect data. Think of this event as of a huge homogeneity factor – whatever we observed in families, teams, groups, departments, firms, etc. has been biased. Not only the phenomena we investigate, but also the ways we investigate these phenomena may have undergone a perceptual shift. Now, it is hard to understand what the effect predicted by the theory was and what the effect caused by confounding factors such as online communication, (lack of) emotionality in conversations, new way of working, lack of control over home-office processes, and many others.

In this situation, longitudinal data collected before and during the pandemics is growing in its value. While the value of randomised experiments remain unchanged, natural experiments may become biased as COVID-19 shifted the perception of several natural phenomena all over the world. And even in the event of a randomized experiment conducted during COVID-19, we cannot be sure that the results remain generalizable in the post-COVID era. At the same time, researchers conducting interviews and making observations during COVID-19 may offer us a lot of interesting insides with regard to pandemics and its impact on organisations and organising. The value of such data is growing enormously. Yet, such studies require time to appear in academic literature.

We hope that our Journal will help you enrich your understanding of the current issues of management. Of course, we did our best to collect actual papers containing new insides from theory and practice. I hope you enjoy reading the current issue!

Faithfully yours,

Deputy Chairman of the Editorial Board

Yevgen Bogodistov

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How Human Decision-making Biases Influence Health Outcomes in Patient Care



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Purpose: Medical treatments and medical decision making are mostly human based and therefore in risk of being influenced by cognitive biases. The potential impact could lead to bad medical outcome, unnecessary harm or even death. The aim of this comprehensive literature study is to analyse the evidence whether healthcare professionals are biased, which biases are most relevant in medicine and how these biases may be reduced.

Approach/Findings: The results of the comprehensive literature based meta-analysis confirm on the one hand that several biases are relevant in the medical decision and treatment process. On the other hand, the study shows that the empirical evidence on the impact of cognitive biases on clinical outcome is scarce for most biases and that further research is necessary in this field.

Value/Practical Implications: Nevertheless, it is important to determine the extent to which biases in healthcare professionals translate into negative clinical outcomes such as misdiagnosis, delayed diagnosis, or mistreatment. Only this way, the importance of incorporating debiasing strategies into the clinical setting, and which biases to focus on, can be properly assessed.

Research Limitations/Future Research: Though recent literature puts great emphasis on cognitive debiasing strategies, there are still very few approaches that have proven to be efficient. Due to the increasing degree of specialization in medicine, the relevance of the different biases varies.

Paper type: Theoretical

Keywords: medical decision making, decision biases, clinical debiasing strategies.

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Як людська упередженість при прийнятті рішень впливає на результат лікування пацієнтів

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Мета роботи: Лікування та прийняття медичних рішень в основному пов'язані з людським фактором і, безумовно, схильні до ризику впливу когнітивних упереджень. Потенційний вплив може призвести до несприятливого медичного результату, непотрібного збитку або навіть смерті. Мета цього всебічного дослідження літератури – проаналізувати докази того, чи упереджені медичні працівники, які упередження найбільш актуальні в медицині і як ці упередження можна зменшити.

Підходи/Результати дослідження: Результати масштабного метааналізу, заснованого на літературних джерелах, підтверджують, з одного боку, що деякі упередження мають безпосереднє відношення до медичного рішення і процесу лікування. З іншого боку, дослідження показує, що емпіричні дані про вплив когнітивних упереджень на клінічний результат недостатні для більшості упереджень і що в цій галузі необхідні подальші дослідження.

Цінність/Практичне значення дослідження: Важливо визначити, в якій мірі упередження з боку медичних працівників призводять до негативних клінічних наслідків, таких як неправильний діагноз, пізня постановка діагнозу або неякісне лікування. Тільки так можна буде належним чином оцінити важливість включення стратегій виключення систематичних клінічних помилок і визначити на яких упередженнях слід зосередити увагу.

Обмеження дослідження/Перспективи подальших досліджень: Незважаючи на те, що в літературі останніх років велика увага приділяється стратегіям когнітивної деградації, все ще існує дуже мало підходів, які довели свою ефективність. Через зростання ступеню спеціалізації в медицині значимість різних упереджень варіюється

Тип статті: Теоретичний

Ключові слова: прийняття медичних рішень; упередженість при прийнятті рішень; стратегії виключення систематичних клінічних помилок.

Как предубеждения людей при принятии решений влияют на результаты лечения пациентов

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Цель работы: Лечение и принятие медицинских решений в основном связаны с человеческим фактором и, следовательно, подвержены риску влияния когнитивных предубеждений. Потенциальное воздействие может привести к неблагоприятному медицинскому исходу, ненужному ущербу или даже смерти. Цель этого всестороннего исследования литературы – проанализировать доказательства того, предвзяты ли медицинские работники, какие предубеждения наиболее актуальны в медицине и как эти предубеждения можно уменьшить.

Подходы/Результаты исследования: Результаты обширного метаанализа, основанного на литературных источниках, подтверждают, с одной стороны, что некоторые предубеждений имеют непосредственное отношение к медицинскому решению и процессу лечения. С другой стороны, исследование показывает, что эмпирические данные о влиянии когнитивных предубеждений на клинический результат недостаточны для большинства предубеждений и что в этой области необходимы дальнейшие исследования.

Ценность/Практическое значение исследования: Важно определить, в какой степени предубеждения со стороны медицинских работников приводят к негативным клиническим исходам, таким как неправильный диагноз, поздняя постановка диагноза или плохое лечение. Только так можно будет должным образом оценить важность включения стратегий исключения систематических клинических ошибок и определить на каких предубеждениях следует сосредоточить внимание.

Ограничения исследования/Перспективы дальнейших исследований: Несмотря на то, что в литературе последних лет большое внимание уделяется стратегиям когнитивной деградации, все еще очень мало подходов, которые доказали свою эффективность. Из-за растущей степени специализации в медицине значимость различных предубеждений варьируется.

Тип статьи: Теоретический

Ключевые слова: принятие медицинских решений; предвзятость в принятии решений; стратегии исключения систематических клинических ошибок.

1. Introduction

Behavioural economics describes how human decision-making is unconsciously influenced by several cognitive biases. While the consequences of biased thinking might not be so significant for the average person, health professionals' biased thinking may affect their decision-making regarding diagnosis and treatment of patients and could potentially lead to misdiagnosis or treatment errors. Such errors may have fatal outcomes, possibly even leading to death. A study by Scopelliti et al. (2015) shows, that on average, individual people assume to be unaffected or less affected by biases than the rest of the population. Due to this fact and the tremendous consequences of biased thinking in medicine, the research is necessary in order to identify whether healthcare professionals are, in fact, biased, which biases are relevant in medicine and how these biases may be reduced.

The objective of this literature-based study is to identify the relevance of human decision-making biases in medicine, analyse their impact as well as elaborate strategies on how to overcome these biases. Based on this objective, the paper aims to answer the following main research questions:

Research question 1: Which human decision-making biases are the most relevant in medical decision-making?

Research question 2: How do these biases influence healthcare professional's decision-making regarding diagnosis and treatment of patients?

Research question 3: What are potential strategies on how to reduce and prevent biases?

After a short introduction to the theoretical framework on medical decision making and on human decision biases, the following literature study will focus on the empirical evidence of human decision-making biases in medicine and the related impact as well as potential strategies of debiasing and their effectiveness.

2. Theoretical background

2.1. Decision-making in medicine

According to the dual process theory (Evans, 2003), evidence shows that a crucial share of medical practice is based on quick and intuitive thinking (Lucchiari & Pravettoni, 2012). It was found that in emergency medicine, for instance, the first judgements about the diagnosis were made even before the first encounter with the patient, and 75% of judgements were generated in the first five minutes of seeing the patient (Pelaccia et al., 2014). There is also evidence that the majority of physicians base their correct diagnostic judgement solely on the patient's main complaint (Gruppen et al., 1988). Evidence also discovers that processes that are considered as analytical thinking, like evaluating different potential diagnoses and gathering positive as well as negative evidence before concluding a final diagnosis, mostly either have a negative or no impact on diagnostic accuracy (Norman et al., 2017). Some studies conclude that when participants were given increased time for the diagnostic decision-making process, the likelihood of reaching the correct diagnosis decreased (Sherbino et al., 2012; Monteiro et al., 2015). There are also findings that the amount of time used on the diagnostic process does not have any impact on the accuracy of the diagnosis (Lambe, Hevey & Kelly, 2018). Hence, the best clinical performance probably results from a balanced combination of analytical and intuitive thinking (O'Sullivan & Schofield, 2018). In their research, Kahnemann and his colleagues identify that biases in human decision making could be detected in both ways of thinking and that even experienced people were found to be vulnerable to biases in their thinking (Kahnemann, Slovic & Tversky, 1982).

2.2. Human decision-making biases

There is a large variety of different biases influencing human decision-making. The following list shows a selection of cognitive biases that are of high relevance and can distort healthcare professionals' judgments and potentially influence their decision making.

- **Anchoring Bias:** The anchoring bias occurs when a person's opinion is influenced by the initial information found or provided to them (Fadus, Odunsi & Squeglia, 2019).
- **Biases Regarding People's Characteristics:** Connected to the anchoring bias, there are several biases regarding a person's characteristics like race, gender, ethnicity, nationality, sexual orientation, socioeconomic status (SES), previous stigmatized diagnoses like AIDS, mental illness or disability. Biases towards these characteristics are often implicit, i.e. unconscious and uncontrollable. They are often displayed towards others in non-verbal manners.
- **Availability Bias:** In order to collect information and knowledge for a decision-making process, people tend to favour information that is more recent and prevalent in the memory since it is easy to recall. This is called the availability bias, as it can lead to an inaccurate perception of the information's relevance and result in a distorted view on the topic (Kahneman et al., 1982).
- **Confirmation Bias:** The confirmation bias is present when selectively searching for information which confirms an already formed opinion rather than looking for contradicting evidence or weighing contradicting evidence less than conformational evidence (Glick, 2017).
- **Base Rate Neglect / Base Rate Fallacy:** The base rate neglect, also called base rate fallacy, is present if the probability of the base rate, which is the original probability, is underweighted or neglected (Kahneman et al., 1982).
- **Premature Closure / Search Satisfying:** A premature closure, also called search satisfying, arises when the search for further or alternative information is stopped upon finding the first reasonable answer (O'Sullivan & Schofield, 2018).
- **Diagnostic Momentum:** Diagnostic momentum describes the acceptance of previous diagnoses made by other physicians, carrying on the current course of treatment or other actions without sufficiently investigating their accuracy (O'Sullivan & Schofield, 2018).
- **Gambler's Fallacy:** If an outcome or an event has recently occurred several times, people are prone to think that it is now less likely to occur again due to the fact that it has already happened (too) many times before (Clotfelter & Cook, 1993). In reality, however, the probability of having a specific outcome stays the same each time as it is independent of prior events or outcomes (Clotfelter & Cook, 1993). This is called the gambler's fallacy.
- **Framing Bias / Framing effect:** People's judgement or actions can be influenced by the way a question is framed or information is presented (Fadus, Odunsi & Squeglia, 2019). This is what is considered the framing effect.
- **Overconfidence:** The overconfidence bias is the tendency to have an inflated view of one's own judgement abilities (Lucchiari & Pravettoni, 2012).
- **Publication Bias:** "[The] Publication bias is the tendency of the parts of investigators, reviewers, and editors to submit or accept manuscripts for publication based on the direction or strength of the study findings" (Dickersin, 1990).

In the following chapter, empirical data on decision-making biases in a clinical setting will be identified and analysed. The aim is to explore whether health professionals are exposed to decision-making biases and the potential impact on patient care.

3. Empirical data on the prevalence of decision-making biases in medicine

Many recent empirical studies on anchoring biases in the medical setting focus on implicit racial, gender and socioeconomic biases in medical students and physicians. Evidence of implicit bias regarding race, socioeconomic status or gender varies, as some studies find biases in health professionals (Haider et al., 2015; Hall et al., 2015; Johnson et al., 2017; Harris et al., 2018) while others do not (Williams et al., 2015). Another study by Pettit et al. (2017) do not show any statistically significant differences in clinical care for patients with different socioeconomic status. However, they do show different behavioural patterns towards patients with a higher socioeconomic status such as a better communication or an increased attentiveness to pain control. The research also found that medical students tend to physically touch patients with a low socioeconomic status more frequently. A recent study by Yamauchi et al. (2019) investigating in the psychiatric and social background of patients found significant differences in clinical decision-making by physicians when patients had a medical history of schizophrenia.

The availability bias has been found to be prevalent in healthcare professionals in several studies (Weber et al., 1993; Hatala et al., 1999; Mamede et al., 2010; Schmidt et al., 2014; Rylander & Guerrasio, 2015), while the results have been consistent throughout the years. A contributing factor that might enhance the availability bias is the tendency of posting health articles on social media. Levels of confirmation bias in health professionals have been shown to influence which articles are shared on social media (Zhao, Fu & Chen, 2020).

While there is not much empirical data on whether health professionals are influenced by the confirmation bias, the studies that do examine this bias in healthcare also find evidence of it (Frotvedt et al., 2020; Atallah et al., 2020).

The findings regarding the base rate fallacy are diverse. While an older study by Weber and colleagues only showed little prevalence of base rate neglect (Weber et al., 1993), a recent study by Kinnear & Jackson (2016) identified the major evidence of representativeness heuristic, resulting in base rate neglect. The latter study also identified that base rate neglect occurred despite a good understanding of statistical probability concepts. One possible explanation for this dissonance could be that the teaching of diagnostic decision-making foregrounds stereotypic presentations of diseases (Kinnear & Jackson, 2016).

With regard to the bias of premature closure, both Berbaum and colleagues (2013) and Rylander & Guerrasio (2015) discovered a premature closure in medicine.

While the diagnostic momentum bias is mentioned as a potential source of an error in several studies, there is not much empirical evidence on the actual prevalence of this bias. In a study by Heritage & McArthur (2019), 53% of treated diseases could be attributed to diagnostic momentum, while doctors even gave diagnoses without seeing the patient in 30% of the time.

Similar to the momentum bias, gambler's fallacy is mentioned in several studies, but the research on its prevalence in the medical field is scarce. One study, however, finds Greek medical residents to be significantly prone to the gambler's fallacy (Msaouel et al. 2014).

Older studies on the prevalence of framing bias only show minimal evidence of bias (Christensen et al., 1991; Christensen et al., 1995), more recent studies indicate that health professionals are more strongly influenced by framing (Perneger & Agoritsas, 2011;

Popovich, Szecket & Nahill, 2019). An interesting finding was, that when rating the efficiency of a new drug, participants were most impacted by framing when risk was presented in a relative format (Perneger & Agoritsas, 2011).

Cucchetti and colleagues (2020) identified that the extent to which physicians are affected by the overconfidence bias seems to be influenced by their professional experience. While the best clinical performance was found in middle-aged doctors, younger and older health professionals were influenced stronger by overconfidence. The reason seems to be that medical students or junior doctors do not yet have complete knowledge for an accurate clinical assessment, not consciously being aware that they might lack in certain information (Cucchetti et al., 2020). With growing experience and the realization that they do not know everything, doctors develop a more critical view of their own knowledge leading to more accurate judgements. With elderly physicians, however, this healthy criticism seems to decrease again with growing confidence in their knowledge due to years of experience. This possibly leads to ignoring or not informing themselves about novel relevant information, leading to lower judgement accuracy (Cucchetti et al., 2020).

Since the thought behind Evidence-based medicine (EBM) is using the research as a base for clinical decision making and actions, it is highly relevant to know whether published randomized controlled trials are influenced by selective publishing based on their outcomes. While there are some studies opposing this, numerous papers find strong indications that the publication of studies in medicine is biased towards positive outcomes, leaving negative or null results either unpublished or published later (Melander et al., 2003; Polyzos et al., 2011; Kicinski, 2013; Chong et al., 2016; De Vries et al., 2018). A study by van Aert, Wicherts & van Assen (2019) found only minimal to no evidence of publication bias, just like Lensen and colleagues (2017), who found no differences in publication versus non-publication or publication time for studies with negative or null results versus positive results. Not only randomized controlled trials and meta-analyses are important sources of information for professionals in medicine, but also systematic reviews on these. Hence, the investigation into whether these systematic reviews of medical research are also biased by the publication bias is highly relevant. One study on systematic reviews in otolaryngology found that authors mostly failed to "mention, plan for, or formally evaluate for the presence of publication bias" (Ross et al., 2019). Similar results were found in another study by Hedin and colleagues (2016). Both studies conclude that the probability of publication bias being present in the reviews is very high.

In addition to these findings about the individual biases, they might be interdependent or linked to each other. The presence of confirmation bias, for example, could potentially induce a premature closure, making clinicians accept a diagnosis without considering plausible alternatives. The same can be said about overconfidence, as a diagnosis might be accepted before its complete verification (Frotvedt et al., 2020). Overconfidence in health professionals does not seem to influence the tendency to be affected by the confirmation bias (Frotvedt et al., 2020). Confidence, however, seems to increase when confirmatory search for information is used rather than searching the information contradicting a previously assumed diagnosis (Frotvedt et al., 2020).

4. The Impact of Biases on Diagnosis and Treatment

When biases are prevalent in a clinical setting, the question arises whether, and if so, which impact decision-making biases have on the process of reaching a diagnosis, giving the correct diagnosis and on the course of treatment.

To start with the impact on the course of a diagnosis, the availability bias, for instance, could potentially increase the risk of unnecessary diagnostic steps as well as unnecessary exposure to

tests. Nevertheless, when the disease description of the current patient matches the previously experienced diagnosis, the availability bias can actually present an advantage of a faster diagnostic process (Weber *et al.*, 1993). Hence, the availability bias can have both negative and positive effects on the diagnostic process.

The confirmation and anchoring bias could also lead to unnecessary diagnostic processes as well as potential misdiagnoses. There is a great chance that clinicians overlook or disregard information that is important to make the right diagnosis with both biases. This could firstly lead to wrong and hence unnecessary diagnostic tests and, secondly, to potential misdiagnosis. A study by O'Hagan *et al.* (2019) showed that when health professionals were provided with observational data rather than a potential diagnosis, they were more likely to identify the correct diagnosis. On the contrary, if a potential diagnosis was provided, clinicians "anchored" for the presented diagnosis. Consequently, it can be concluded that the anchoring bias has a significant impact on the diagnosis of patients. Another bias that could easily lead to misdiagnosis is the gambler's fallacy. A premature closure can make healthcare professionals not only prone to misdiagnosing, but also to failing to notice potential coexisting diagnoses due to the premature ending of the diagnostic process. The same holds true for diagnostic momentum.

Additionally, there is the risk of wrong treatment as a result of an incorrect diagnosis. Even a delayed correct diagnosis can already cause avoidable harm to the patient as they might first receive either incorrect or no treatment at all, which can potentially worsen their condition. This might happen as a result of the overconfidence bias, when a physician overestimates their judgement ability, and possibly gives a wrong diagnosis and accordingly the wrong treatment. With the base rate neglect, there might be the opposite risk of treating a patient who does not need treatment.

A potential consequence of the framing effect is that it can influence the perception of risk and benefit of certain treatments (Perneger & Agoritsas, 2011). As a result, the distorted perception may result in doctors over- or underestimating benefit and risk of a treatment or drug and hence choosing an option, which might not necessarily be ideal.

While there is no clear evidence that implicit bias in socioeconomic status has a direct influence on medical decision making (Haider *et al.*, 2015; Pettit *et al.* 2017), it is found that implicit bias is rather expressed in the behaviour towards patients. Physicians have been found to pay more attention to pain control and had a better communication with patients of a higher socioeconomic status, while the opposite has been true for patients of a lower socioeconomic status (Pettit *et al.*, 2017). Similar results have been found for implicit racial bias. As a result, implicit racial bias in health professionals leads patients to have lower confidence in treatment recommendations (Penner *et al.*, 2016) and to struggle more to adhere to them (Hagiwara *et al.*, 2013; Penner *et al.*, 2016).

Regarding gender bias, the research has found the evidence of disparities in diagnostic and treatment decisions between men and women in healthcare. The extent of investigation as well as treatment differs between men and women, even when both present the same symptoms, leading to women being less likely to receive an appropriate diagnosis or treatment (Bönte *et al.*, 2008; Hamberg, 2008). Women's symptoms have been found to rather be interpreted as psychosocial or non-specific symptom diagnosis, while men's symptoms have rather been interpreted as organic (Bönte *et al.*, 2008).

5. Debiasing Strategies in Medical Decision-making / Mitigation Approach

Cognitive debiasing is the process of reducing or eliminating cognitive biases in order to make more rational and ideal decisions. Other words for this process are cognitive forcing

strategies or cognitive bias mitigation (CBM). Recent research has a great emphasis on reducing and preventing decision-making biases in a medical setting. Based on this research, several CBM strategies for the previously identified biases in the clinical setting will be elaborated.

One attempt to reduce cognitive biases in clinical decision-making described in the literature is guided reflection intervention, where the more reflective and analytical type of reasoning is applied (Norman *et al.*, 2017; O'Sullivan & Schofield, 2018; Lambe, Hevey & Kelly, 2018). This strategy motivates health professionals to consider other potential diagnoses and collect confirming as well as disconfirming data and evidence prior to giving a final diagnosis (Lambe, Hevey & Kelly, 2018). In other words, physicians should "slow down" when making the diagnosis (O'Sullivan & Schofield, 2018).

An example of a tool related to slowing down, examined by O'Sullivan & Schofield (2019), is the so called "SLOW intervention" (Fig. 1). This cognitive forcing tool was applied after each clinical case which the participants of the study had to evaluate for a diagnosis. Additional to the word "slow" as a reminder to slow down, four questions, beginning with each letter of the word, are asked.

SLOW

Lets **slow** down a little and just review our decisions...

S	Sure about that? Why?	<input type="checkbox"/>
L	Look at the data, What is L acking, does it all L ink together ?	<input type="checkbox"/>
O	O pposite - What if the opposite is true?	<input type="checkbox"/>
W	W orst case scenario, W hat else could this be?	<input type="checkbox"/>

Figure 1: Cognitive mitigation tool by O'Sullivan & Schofield (2019)

These questions were supposed to function as a metacognitive trigger and improve diagnostic accuracy. Each question is aiming at mitigating different biases. The following biases were included in the study: "representative bias, conjunction fallacy, overconfidence, base rate neglect, diagnostic momentum, [...], the framing effect, conjunction rule and availability bias". Even though doctors involved in the study stated a perceived positive effect on the diagnostic accuracy, quantitative data could not support their subjective observation. Although this cognitive forcing tool led to diagnostic improvements in some cases, the overall results were not statistically significant. The SLOW intervention showed to be the most efficient in reducing the confirmation bias in this study (O'Sullivan & Schofield, 2019).

Bhatti (2018) suggests the use of a checklist to reduce bias and increase the diagnostic accuracy. The checklist includes steps like a diagnostic time-out, formulating several diagnostic hypotheses (differential diagnoses) as well as the removal of one's past form the patient. The latter may be useful to mitigate the framing bias. A study indicates that in 80% of cases of a diagnostic error, the absence of a differential diagnosis was considered the cause (Bhatti, 2018). Therefore, the formulation of several potential diagnoses could decrease diagnostic errors. The diagnostic time-out can potentially be beneficial to reduce the availability bias, the premature closure and the confirmation bias by having the time to gain a new perspective, rethinking the diagnosis and not ending the diagnostic process too fast. Similar to Bhatti, another study by Kasick and colleagues (2019) aimed to increase the diagnostic accuracy by a diagnostic time-out and using their Differential Diagnosis Scoring Rubric. The Differential Diagnosis Scoring Rubric is a scoring tool to increase documentation and quality of

differential diagnoses. Even though this study does not specifically aim to mitigate biases, their principle is similar to the above-mentioned ones. Their study indicates an increased quality of the documented differential diagnosis, which might increase the diagnostic accuracy.

A different approach on reducing bias, which is rather applicable for smaller groups, is discussing diagnostic examinations at meetings with other clinicians or medical students (Bhatti, 2018). As biases seem to be the result of unconscious thinking patterns, teaching better clinical reasoning and metacognitive skills appear to be a good approach to mitigate biases in clinical decision making. Metacognition is described as “the awareness of, and insight into one’s own thought process” (O’Sullivan & Schofield, 2018). In addition, as many biases are based on statistical principals, educating medical students on these as well as statistical biases seems to be important, especially as statistics is currently lacking in the medical curricula (O’Sullivan & Schofield, 2018).

Although teaching about biases and critical thinking might not necessarily lead to less diagnostic errors, it helps to increase the awareness for biased decision making and improves professionals’ critical thinking skills (O’Sullivan & Schofield, 2019; Royce, Hayes & Schwartzstein, 2019). A study by Reilly et al. (2014) found that case-based teaching of bias awareness caused “the development and implementation of algorithms and protocols for avoiding affective bias (bias due to an emotional response), the use of standardized neurological evaluations, and increased consultations for difficult cases” (Royce, Hayes & Schwartzstein, 2019).

Nevertheless, cognitive bias mitigation is a challenge due to various reasons. Since most human cognitive biases are implicit, it is very difficult to tackle them. Bhatti (2018) describes that “inherent psychological defence mechanisms shield our cognitive processes from self-analysis and critique”, which illustrates the underlying problem. As many health professionals are prone to the bias blind spot and hence do not recognise their biases, getting them to integrate CBM strategies into their decision-making processes may be difficult. It is important and a challenge to transfer the evaluated mitigation strategies into a real-life setting where health professionals are eager to use them (Ludolph & Schulz, 2017). Another challenge in the research of cognitive debiasing is the lacking internal coherence in the terminology of biases as well as debiasing strategies (Ludolph & Schulz, 2017). In different studies, names of biases and especially names of debiasing strategies differ widely, even when describing the same concept. Additionally, the research studying the impact and efficiency of cognitive debiasing strategies is limited by methodological problems (Royce, Hayes & Schwartzstein, 2019).

6. Conclusion

6.1. Summary of Findings and Discussion

The first part of this article deals with the analysis of empirical data on the prevalence of cognitive biases in a clinical setting. The results show that availability bias, premature closure, framing bias, socioeconomic, racial/ethnic and gender bias have been confirmed to be prevalent in medical students and physicians. The publication bias towards positive outcomes as well as underrepresentation of women in medical trials and literature has also been noted to have a material impact as well as a great impact on evidence-based medicine. While there is only very limited research on the confirmation bias and diagnostic momentum, the available data also confirms their occurrence in medicine. The findings on the base rate neglect, anchoring bias and overconfidence bias are diverse, while the latter two seem to be dependent on the degree of experience of health professionals.

The empirical data on the impact of these biases on patient outcomes is scarce. Some studies documented the potential of misdiagnosis and mistreatment due to the availability and anchoring bias. Serious consequences due to an incorrect diagnosis or treatment could also result from the diagnostic

momentum, premature closure and base rate neglect, even though this is not empirically confirmed. The research regarding the framing effect identifies a great impact on the judgement of treatments in both health professionals and patients. Moreover, the high prevalence of the publication bias can have a huge impact on physicians’ decision-making. Since evidence-based medicine relies on empirical data, health professionals will have a distorted view and make imperfect decisions as a consequence of only fragmentary published data. Additionally, the continued underrepresentation of women in clinical trials, textbooks and other medical literature is likely to result in physicians missing diagnoses, misdiagnosing, or mistreating women.

Regarding cognitive bias mitigation approaches, there are still very few effective strategies to reduce biases in the clinical setting, even though recent research has a great focus on the mitigation research. Some effective debiasing strategies include framing risks differently (e.g. using frequency format and absolute numbers or using subsets) to reduce base rate neglect and the framing effect and “confidence-based assessment” to reduce overconfidence. The strategies encouraging the use of a more reflective thinking such as slowing down, considering the opposite or the use of checklists were found to be effective only for some biases. These include a premature closure, the confirmation, anchoring, and the availability bias. Bias specific teaching helps to increase awareness about biases and improve critical thinking. This approach, however, seems to fail to reduce diagnostic errors. The same applies to cultural competency training and sessions about gender to increase awareness and reduce health disparities. In order to challenge the publication bias, editors and authors must take measures to make sure that both positive and negative or null-result studies get published and represented in journals.

6.2. Limitations and Future Research

Some studies mentioned in the analysis are limited to a certain country or specific medical field. This is true especially for the evaluation of prevalence and impact of cognitive biases in the clinical setting as well as the effectiveness of mitigation strategies. Additionally, it is particularly relevant for studies evaluating biases where only little evidence is available, such as diagnostic momentum, gambler’s fallacy, base rate neglect and confirmation bias. For instance, the two studies, by Frotvedt (2020) and Atallah (2020), analysing confirmation bias are geographically limited to Norway and the US, respectively. The mentioned study by Msaouel and colleagues (2014), examining Gambler’s fallacy, includes only Greek medical residents, while Heritage & McArthur’s (2019) study, investigating diagnostic momentum, solely includes US physicians. Studies exploring a premature closure and overconfidence are mostly limited to certain medical fields. Berbaum and colleagues (2013) exclusively enrolled radiologists in their study, while Cucchetti and colleagues (2020) focused on Gastroenterologists, Hepatologists and Surgeons. Consequently, the results of these studies cannot be generally applied as they may not be significant in other countries or different medical fields.

As the empirical evidence on the impact of cognitive biases on clinical outcome is scarce for most biases, especially on diagnostic momentum, premature closure and base rate neglect, further research is necessary in this field. It is important to determine the extent to which biases in healthcare professionals translate into negative clinical outcomes such as misdiagnosis, delayed diagnosis, or mistreatment. Only this way, the importance of incorporating debiasing strategies and tools into the clinical setting, and which biases to focus on, can be properly assessed.

Furthermore, even though recent literature puts great emphasis on cognitive debiasing strategies and suggests several methods how to reduce or prevent biases, there are still very few approaches that have proven to be efficient. Therefore, much more research is needed to identify and develop more successful strategies.

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8. Competing interests



The authors declare that they have no competing interests.

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Enhancing and Restricting Factors of Formal Voluntary Engagement in Tyrol and the Impact of the Pandemic

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Purpose: The insurmountable tensions and turmoil caused by the COVID-19 pandemic in welfare systems worldwide demand governmental as well as non-governmental support, especially from the volunteer sector, which can be a powerful resource for mitigating the pandemic's impacts. To identify ways of mobilising the enormous human resources of the baby boomer generation in particular, whose members are currently on the brink of entering retirement, the factors that have enabled and restricted volunteer management during the pandemic in Tyrol, Austria are examined.

Design/Method/Approach: Following a qualitative approach, the authors performed 27 problem-centred interviews with representative senior citizens, retirees and individuals about to retire and companies in Tyrol. The authors evaluated the data in qualitative content analysis.

Findings: Self-determination, time flexibility, acceptance of volunteer work in one's social network and previous personal experience with volunteering are key determinants of sustainable volunteer work amongst retirees. Companies and a well-established acquisition management strategy also play a significant role in promoting volunteer work.

Practical Implications and Originality/Value: The study involves a holistic analysis of volunteer work at the individual and organisational levels. By capturing the potential of e-volunteering and how it improves the capacities of classic face-to-face volunteer work, it can support the development of more resilient infrastructures for supporting volunteer work.

Research Limitations/Future Research: The interpretation of visual and non-verbal signals was difficult due to the use of phone and online interviews, and the results should not be generalised. Even so, our findings pave the way for future studies on mechanisms determining virtual volunteering and volunteer management.

Paper type: Empirical

Keywords: medical decision making, decision biases, clinical debiasing strategies.

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Фактори, що стимулюють та обмежують волонтерський рух в Тиролі, та вплив пандемії

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Мета роботи: Непереборна напруженість і заворушення, викликані пандемією COVID-19 в системах соціального забезпечення по всьому світу, вимагають як державної, так і неурядової підтримки, особливо з боку волонтерського сектора, що може стати потужним ресурсом для пом'якшення наслідків пандемії. Щоб визначити способи мобілізації величезних людських ресурсів, зокрема, покоління бебі-бумерів, яке в даний час планує вихід на пенсію, досліджуються фактори, що стимулюють і обмежують волонтерське управління під час пандемії в Тиролі, Австрія.

Дизайн/метод/підхід дослідження: Дотримуючись якісного підходу, автори провели 27 проблемно-орієнтованих інтерв'ю з літніми людьми, пенсіонерами та людьми, які збираються вийти на пенсію, та компаніями в Тиролі. Автори оцінили дані за допомогою якісного контент-аналізу.

Результати дослідження: Самовизначення, гнучкість у часі, прийняття волонтерської роботи в соціальній мережі і попередній особистий досвід волонтерської діяльності є ключовими факторами, що визначають стійку волонтерську роботу серед пенсіонерів. Компанії і стратегія управління волонтерством, яка вже добре себе зарекомендувала, також відіграють важливу роль в просуванні волонтерської роботи.

Практичне значення і оригінальність/цінність дослідження: Дослідження включає цілісний аналіз волонтерської роботи на індивідуальному та організаційному рівнях. З огляду на потенціал е-волонтерства і то, як воно покращує можливості класичної особистої волонтерської роботи, воно може підтримати розвиток більш стійких інфраструктур для підтримки волонтерської роботи.

Обмеження дослідження/майбутні дослідження: Інтерпретація візуальних і невербальних сигналів була складною через використання телефонних і онлайн-інтерв'ю, і результати не слід узагальнювати. Проте, результати відкривають шлях для майбутніх досліджень механізмів, що визначають віртуальне волонтерство та управління волонтерством.

Тип статті: Емпіричний

Ключові слова: управління волонтерами; покоління бебі-бумерів; е-волонтерство.

Стимулирующие и ограничивающие факторы волонтерского движения в Тироле и влияние пандемии

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Цель работы: Непреодолимая напряженность и беспорядки, вызванные пандемией COVID-19 в системах социального обеспечения по всему миру, требуют как государственной, так и неправительственной поддержки, особенно со стороны волонтерского сектора, что может стать мощным ресурсом для смягчения последствий пандемии. Чтобы определить способы мобилизации огромных человеческих ресурсов, в частности, поколения бэби-бумеров, которое в настоящее время планирует выход на пенсию, исследуются факторы, стимулирующие и ограничивающие волонтерское управление во время пандемии в Тироле, Австрия.

Дизайн/метод/подход исследования: Следуя качественному подходу, авторы провели 27 проблемно-ориентированных интервью с пожилыми людьми, пенсионерами и людьми, которые собираются выйти на пенсию, и компаниями в Тироле. Авторы оценили данные с помощью качественного контент-анализа.

Результаты исследования: Самоопределение, гибкость во времени, принятие волонтерской работы в социальной сети и предыдущий личный опыт волонтерской деятельности являются ключевыми факторами, определяющими устойчивую волонтерскую работу среди пенсионеров. Компании и хорошо зарекомендовавшая себя стратегия управления приобретениями также играют важную роль в продвижении волонтерской работы.

Практическое значение и оригинальность/ценность исследования: Исследование включает целостный анализ волонтерской работы на индивидуальном и организационном уровнях. Учитывая потенциал е-волонтерства и то, как оно улучшает возможности классической личной волонтерской работы, оно может поддержать развитие более устойчивых инфраструктур для поддержки волонтерской работы.

Ограничения исследования/будущие исследования: Интерпретация визуальных и невербальных сигналов была сложной из-за использования телефонных и онлайн-интервью, и результаты не следует обобщать. Тем не менее, наши результаты открывают путь для будущих исследований механизмов, определяющих виртуальное волонтерство и управление волонтерством.

Тип статьи: Эмпирический

Ключевые слова: управление волонтерами; поколение бэби-бумеров; е-волонтерство.

1. Introduction

The COVID-19 pandemic's direct and indirect impacts on social and economic structures have caused rapid changes over the world, including Austria (Kittel *et al.*, 2020). Indeed, as the global economy plunged into the deepest recession since the Great Depression of the 1930s (Fenz *et al.*, 2021), so did Austria's national economy. There and elsewhere around the world, the pandemic has posed serious challenges in all fields of welfare – social services, healthcare, labour services and unemployment services – as well as for individuals and families. As François Dubet describes it, COVID-19 has forced us to rediscover society (Dubet, 2021) and, in some time, will most likely exacerbate inequalities and poverty globally.

To be sure, due to social stratification, individuals and households of disparate socio-economic status have varying capacities for the intensity, resilience and stamina needed to continue observing practices to prevent and mitigate COVID-19 (Prosser *et al.*, 2020). According to a list of at-risk populations identified by the United Nations (2020), older adults, women, migrants and people with disabilities are more at risk of being adversely affected by the pandemic than the rest of the population and thus need special attention as COVID-19 runs its course. In Austria, the pandemic has also hit vulnerable groups far harder than the rest of the population (Kittel *et al.*, 2020; Pieh, Budimir, & Probst, 2020; Traunmüller *et al.*, 2020b), and though the country's welfare system is resilient and well-equipped (Hussain, 2016; Schraad-Tischler *et al.*, 2017), its services have been under intense pressure during the COVID-19 crisis. In fact, in an immediate response to lockdowns, governmental and non-governmental welfare providers have had to either scale or shut down their services in order to comply with COVID-19 security measures (Carlsen, Toubøl, & Brincker, 2020).

Amongst traditional indicators of robust welfare systems – poverty prevention, labour market access, health and education – its engagement with civil society (Burmester & Wohlfahrt, 2016) assumes an especially important role in times of crisis (Simsa, 2017). The COVID-19 pandemic has not only created profound difficulties in providing social services (Comas-Herrera *et al.*, 2020) and social work (Amadasun, 2020) but has also increased the care burden of women and families (Power, 2020) and worsened disparities for disadvantaged groups in education systems (Murphy & Wyness, 2020). Volunteering in health care related areas is a crucial part of the Austrian welfare system, most obvious in the number of 3528 hospice and palliative care volunteers in 2016 (Pelttari & Pissarek, 2018). This specific sector was confronted with a break in patient interaction during the pandemic as Pawłowski & Leppert (2021) identified a significant reduction of utilization of volunteer work in palliative care, supported by findings by Oluyase *et al.* (2021). The pressure on the health care system during the pandemic is enormous and the toll healthcare workers are substantially paid (Mehta *et al.*, 2021).

Because public resources are not as flexible and numerous as needed to cope with the pandemic's impacts, volunteer work has increasingly received attention as a potential source of support. Especially in recent years, a shift to more flexible, project-based forms of volunteer work has been pursued (McLennan, Whittaker, & Handmer, 2016), which may also support ways of coping with and mobilising sufficient human capital for the pandemic's current and upcoming challenges. The baby boomer generation, including the large birth cohorts from 1955 to 1969, has begun to demonstrate its tremendous potential for the volunteer sector as its members have started to retire (Hansen & Slagsvold, 2020; Pettigrew *et al.*, 2019). In fact, because volunteer work presents the opportunity to enhance healthy ageing (Carr & Hendricks, 2011; Jongenelis *et al.*, 2019; Niebuur *et al.*, 2018; Pavelek, 2013), retirees can benefit from a

strong volunteer sector as much as a welfare regime and its society.

Considering all of the above, we sought to examine the ways of managing sufficient acquisition strategies and to identify factors that enable and restrict volunteer work among retirees and people about to retire. This article introduces the volunteer sector in Austria and its implications, discusses issues in managing volunteers at an organisational level as well as motivational factors amongst individuals and explains the impact of the COVID-19 pandemic on the current landscape of volunteer work.

2. Theoretical background

2.1. Volunteer work and its dynamics in Austria

Formally, *volunteer work* refers to any contribution of unpaid time to an organisation or another established entity (Lee & Brudney, 2009). According to that definition, 31% of Austria's population is engaged in formal volunteer work. As shown in Fig. 1, the greatest rate of formal volunteer engagement, 38%, occurring in the 60–69-year-old age group (Feistritzner, 2019; IFES (Institute for Empirical Social Research), 2016), highlights the outstanding potential of baby boomers' for volunteering, given their current or impending retirement, relatively good health and skills from former professions that remain applicable in volunteer work (Hansen & Slagsvold, 2020).

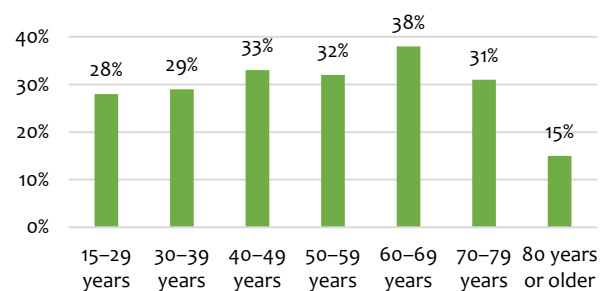


Figure 1: Proportion of formal volunteer engagement in Austria by age group in 2016

Source: Authors' representation based on numbers from IFES (2016)

In the Austrian state of Tyrol, about 52% of the population are engaged in formal volunteer work, it is a significantly higher rate of participation than the national average has (IFES, 2016). One of the reasons is the fact that Tyrol's Volunteer Partnership and volunteer centres are in each of its nine districts, all of which are involved in organising and developing the landscape of volunteering in Tyrol. Of course, that clear structural advantage for fostering volunteer work benefits from also fostering drivers of the likelihood to be engaged in such work, including previous experience with volunteering (Ehlers, Naegele, & Reichert, 2011; Niebuur *et al.*, 2018), good socio-economic status (Hank & Erlinghagen, 2010; Niebuur *et al.*, 2018) and good health (Ehlers *et al.*, 2011; Pavelek, 2013).

Moving forward, the societal ageing process and rising rates of retirement will impact social, economic and political structures all over the world (OECD, 2013). Although both trends endanger the sustainability of Austria's welfare state as well as social benefits for older adults (Carr & Hendricks, 2011), they also stand to fuel sociocultural changes, including the increased involvement of older adults in society (Reidlinger, 2011). At the same time, whereas the ongoing COVID-19 pandemic poses great challenges for Austria's social system (Kittel *et al.*, 2020), the volunteer sector shows exceptional promise for bringing about dynamic social and digital changes as it is becoming increasingly visible amid a growing

¹ In Austria, baby boomers are defined as members of the generation born from 1955 to 1969 (Meier, 2019; Wanka, 2019).

demand for flexible, episodic, project-based forms of volunteer work (McLennan et al., 2016), a trend that applies especially to the baby boomer generation (Hansen & Slagsvold, 2020). As new forms of volunteering, including digital ones, are becoming more relevant (McLennan et al., 2016), they at once pose challenges and opportunities. Therefore, it is crucial to have systems in place and strategies at hand for handling not only critical events such as the COVID-19 pandemic but also structural changes.

2.2. Volunteer management

Well-planned volunteer programmes help to recruit more volunteers (Reamon, 2016) and are crucial for a sustainable volunteering environment (Healy et al., 2008). An effective volunteer programme is important not only for volunteer organisations but also for companies engaged in corporate volunteering, or employee volunteering, defined as a societal commitment observed by employees (Beschorner & Schank, 2012). Corporate volunteering also often serves as a launchpad for companies to begin practising corporate social responsibility (Dreesbach-Bundy & Scheck, 2018).

Generally, the process of volunteer management involves three major phases – the recruitment, engagement and retention of volunteers – all of which have become even more challenging due to the COVID-19 pandemic (Lachance, 2020). Once the purpose of a volunteer programme is established and its plan for execution is developed, it is essential to accept volunteers (i.e. recruitment) and determine how they will be used (i.e. engagement). Last, the retention of volunteers depends upon the first developing clear objectives and later directly involving volunteers and other stakeholders in developing the programme. Thus, the phases of recruitment and retention cannot be separated and should occur

simultaneously, ideally by beginning to apply retention strategies upon first meeting a new potential volunteer (Kappelides, Cuskelly, & Hoye, 2018; Reamon, 2016).

2.3. Implementing the group socialisation model in volunteer management

According to Reamon (2016), the group socialisation model can be applied to volunteer management as a means to successfully build and sustain relationships and to improve recruitment and retention. The model derives from the findings by Levine and Moreland (1994), who identified five stages of volunteer management to explain the changing dynamics between individuals and their groups: investigation (i.e. recruiting, screening and interviewing), socialisation (i.e. identifying volunteer orientations), maintenance (i.e. maximising contributions and promoting emotional involvement), resocialisation (i.e. renewing commitment to the organisation) and remembrance (i.e. retirement). Overall, the model highlights the importance of building relationships between the organisation and volunteers at every stage and to examine and consider each volunteer's motivation from the outset (Reamon, 2016). Because motivation is a crucial component in volunteer management, it is worth discussing one of the most influential theories on the topic: the functional approach to volunteerism, a multidimensional construct that represents the complexity of motives for volunteer work (Clary & Snyder, 1999; Güntert et al., 2016; Snyder, Clary, & Stukas, 2000). Based on six chief functions, the functional approach assumes that volunteers can have a variety of motivations for engaging in volunteer work (Clary & Snyder, 1999; Snyder et al., 2000), as detailed in Tab. 1.

Table 1: Six chief functions of volunteering

Function	Definition
Values function	Volunteering to express personal values and concern for others (e.g. doing something that is important to oneself)
Career function	Volunteering to have career-related advantages (e.g. developing skills and career-related networking)
Social function	Volunteering to strengthen social relationships and meet social expectations and norms (e.g. feeling social pressure to volunteer)
Understanding function	Volunteering to learn about oneself and/or the world or to learn new skills (e.g. learning about one's strengths)
Protective function	Volunteering to keep oneself occupied and thus from engaging in destructive behaviour (e.g. reducing feelings of guilt for being better off than others)
Enhancement function	Volunteering to improve self-worth and thus self-esteem (e.g. feeling needed)

Sources: Clary and Snyder (1999), Snyder et al. (2000)

According to a meta-analysis by Okun and Schultz (2003), the social function becomes more important for older adults as career and understanding lose importance, whereas the values function is the most important function across all age groups (Okun & Schultz, 2003). Thus, the first task of volunteer management is to accommodate developments such as project-based volunteer work, the ageing of society and digitalisation and, by extension, the shifting importance of the six functions. The second challenge is to respond to current, sudden exogenous impacts (e.g. the COVID-19 pandemic) and maintain a social net to evolve, transform and establish sustainable development, even out of such crises. Last, when reflecting on the group socialisation model of volunteer management and the key components of motivation, it is imperative to understand the ways of managing a sufficient acquisition strategy for volunteers in changing, challenging times. For such an understanding, factors that enable and restrict volunteer work for retirees and people about to retire, both in general and under the influence of the COVID-19 pandemic, need to be identified.

3. Data and methods

Our research followed a qualitative design, which allowed us to refer to narratives and experiences (Gay, Mills, & Airasian, 2012) while observing a flexible, adaptive, less structured research procedure (Braun, Clarke, V., & Gray, 2017), all to clarify the deeper causes behind the problem being studied and its consequences (Flyvbjerg, 2006). To enhance our study's quality, we strove for Lincoln and Guba's (1985) four criteria of quality: credibility, transferability, dependability and confirmability. We also ensured intercoder reliability (Mayring, 2014) by hosting weekly peer debriefing sessions during data collection and data analysis. In total, we conducted 27 qualitative, problem-centred expert interviews (Witzel & Reiter, 2012) following an open, explorative approach with attention to narrative elements (Scheibelhofer, 2008). The literature review served as a basis for setting thematic priorities for the interviews without having to establish a rigid interview guide, which ultimately strengthened our exploratory approach. The thematic topics addressed in the expert interviews included challenges with volunteer work and acquisition management in the five phases (1) introduction and thematic frame, (2) recruitment, (3) engagement, (4) retention and finally (5) outlook, final statement, closure and recap. Each phase

contained specific topics associated with the literature as displayed in *Tab. 2*. The thematic blocks served as a rough orientation but should not restrict the conversation, depending to the interviewees there was no stringent chronology to thematise the

content. For example, it happened that after the first phase some of the interviewees jumped right to COVID-19 and other topics were discussed later on.

Table 2: Thematic blocks associated with the literature

Phase	Thematic topics
1. Introduction and Thematic Frame	<ul style="list-style-type: none"> • First acquaintance, biography (<i>Hank & Erlinghagen 2010; Pavelek, 2013</i>) • Experiences with volunteer work (<i>Ehlers et al., 2011; Niebuur et al., 2018</i>) • Current trends in and challenges of volunteer work (<i>Carr & Hendricks, 2011; Reidlinger, 2011; McLennan et al., 2016; Jongenelis et al., 2019; Hansen & Slagsvold, 2020</i>) • Current frameworks of volunteer work in Tyrol
2. Recruitment	<ul style="list-style-type: none"> • Motivation (volunteers) (<i>Beschorner & Schank, 2012</i>) • Strategies (professionals) (<i>Healy et al., 2008; Reamon, 2016</i>) • Incentives for companies and individuals (<i>Dreesbach-Bundy & Scheck, 2018</i>)
3. Engagement	<ul style="list-style-type: none"> • Motivation (volunteers) (<i>Beschorner & Schank, 2012</i>) • Strategies (professionals) (<i>Healy et al., 2008; Reamon, 2016</i>) • Different functions of volunteer work (<i>Clary & Snyder, 1999; Güntert et al., 2016; Snyder et al., 2000</i>) • The potential for volunteer work amongst baby boomers (<i>Okun & Schultz, 2003</i>) • Differences between urban and rural areas • Best practices in volunteering
4. Retention	<ul style="list-style-type: none"> • Motivation (volunteers) (<i>Levine and Moreland, 1994</i>) • Strategies (professionals) (<i>Kappelides et al., 2018; Reamon, 2016</i>) • Best practices in volunteering
5. Final statement, Outlook, Closure and Recap	<ul style="list-style-type: none"> • The COVID-19 pandemic's impact on the landscape of volunteering (<i>Burmester & Wohlfahrt, 2016; Simsa, 2017; Lachance, 2020; Pawłowski & Leppert, 2021</i>) • Collaborations to improve volunteer work

Source: developed by the authors.

The collection of data followed a two-step process of interviewing experts as well as experts by experience. We defined experts as “people with learned expertise” and experts by experience as “people with lived experience”, as proposed by Orton (2019, p. 132). Subsequently, theoretical sampling and theoretical saturation (Bluff, 2005; Glaser & Strauss, 1967; Strauss & Corbin, 1996) were the guiding principles for establishing a maximum contrasting sample (Witzel, 2000). The first step of the process was interviewing experts in volunteer work, economics and social services; that sample of experts represented seven umbrella institutions in Tyrol, including two associations representing senior citizens, the Austria Chamber of Commerce, two volunteer centres, the Volunteer Partnership, the Tyrolean Benevolent Fund and an expert in volunteer work in Tyrol. In the second step, retirees and people about to retire, along with representatives at the managerial level of organisations in Tyrol, were interviewed as experts by experience. The sample of retirees and people about to retire included people who had retired in the last 2 years and people who planned to retire in the next 2 years. The final sample thus included eight retirees and people who were about to retire.

For companies, the selection criteria were based on the industry or sector and the company's size. The final sample included 10 companies from the social services sector, the transport industry, the glass industry, the information technology industry, the energy industry, the wood-based materials industry and the public services sector. By size, the companies ranged from a two-man business to an organisation with approximately 10,000 employees. *Tab. 3* shows the distribution of the sample by experts, retirees and people about to retire and companies.

The interviews were recorded and transcribed following relevant ethical standards and considerations, after which the transcripts were subjected to qualitative content analysis according to Mayring (2014). The aim of the content analysis was to reduce material to a comprehensive level while maintaining the essential content, which we achieved by developing a system of categories (Mayring, 2014), defined as classes of statements representing the principal objects of our research (Mayring, 2014). Most categories were established prior to coding and drew from the theory and literature, which amounted to a deductive approach. Nevertheless,

a couple of categories were established inductively, namely by formulating new categories from the interview material, in order to create and confirm new theories (Gläser & Laudel, 2019).

4. Results

Results from the interviews afford insights into the different areas of volunteer management, starting with individual and contextual aspects of opportunities and challenges with involving people in formal volunteer work.

For example, if my neighbour was sick, then I would take care of her for as long as she was sick. [I am open to] Just helping out when I'm needed without fully committing myself to some other type of volunteer work.

Informal volunteer work is widespread, varied and difficult to measure. Although it fulfils different needs for support across society, it is challenging to manage and depends upon the individual social network. Beyond that, the most vulnerable groups in society may not benefit from such informal structures. As discussed above, volunteer management has to react to trends (e.g. the rise of project-based volunteer work) and societal changes (e.g. the ageing of society). As represented by the previous quotation, our interviewees value a certain amount of freedom, flexibility with time and self-determination during their retirement as well as in their volunteer work. Therefore, recruiting often means providing nothing less than a formal structure that generates the benefits of informal volunteer work:

I really enjoy spending my time however I want. [...] I don't want to commit to something that requires me to be at a certain place at a certain time.

Now we [baby boomers] are finally retiring. Now we want to enjoy our freedom.

Since I've retired, every day has passed so fast. [...] That's really how it is. I have a lot to do.

Table 3: Distribution of the sample

			Absolute (n)
Experts	Total		9
	Distribution by gender	Men	3
		Women	6
	Total		8
	Age: M (SD), range		62 (1,36), 60–64
Retirees and people about to retire	Distribution by gender	Men	3
		Women	5
	Distribution by highest level of education	Doctorate or equivalent	1
		Master’s or equivalent	2
		Bachelor’s or equivalent	0
		Post-secondary, non-tertiary education	1
		Upper secondary education	2
	Distribution by retirement status	Lower secondary education	2
		Retired	6
		Not retired	2
Companies	Total		10
	Industry or sector	Social & health sector	2
		Transport industry	2
		Glass industry	1
		Information technology industry	1
		Energy industry	1
		Wood-based materials industry	1
		Public services sector	2
	Number of employees	1–9	1
		10–49	0
		50–249	3
		250–999	1
		>1000	5
	Position of the interviewee	Department manager	1
		Managing director	3
Director		1	
Human resources manager		3	
Owner		1	
Chairman of the Works Council		1	

Source: developed by the authors.

Volunteer organisations are thus confronted with assuming the role of a host organisation by offering volunteer positions that can be highly flexible and do not require specific, time-intensive training. Short-term volunteer activities, however, can increase rates of participation not only in volunteer organisations but also in companies that participate in corporate volunteer activities. That arrangement offers the companies a more flexible way of organising the projects that their employees want to engage in. It can also boost the participation of employees provided that their employers offer flexible work times:

We [our company] have an electronic time-recording system with very little core time. That means that the employees can organise their work with a lot of flexibility, except for mandatory times when they’re supposed to be on duty or in the office.

A work environment that supports formal volunteer work before retirement is also crucial, for some retirees want to use their professional skills during retirement to help others:

In this third stage of life [...], I can give back to society by using part of the skills that I acquired throughout my life. That’s a key factor for me.

Experts further stressed the relevance of non-monetary incentives or rewards to volunteers to show appreciation. The non-monetary aspect is important as monetary incentives will send wrong signals. Respondents mentioned a broad range of possibilities, from granting titles to volunteers, awarding certificates, offering volunteers the participation in trainings (e.g. first-aid course for free) as well as social rewards or non-monetary rewards such as compensating transportation costs.

In our sample, the subjectively felt social responsibility to give something back in retirement emerged as a common reason to volunteer. Retirees with work experience in the social sector and people experienced with volunteer work seemed more prone to participate in volunteer activities again:

I used to work in a social institution with clients. When I retired, I kept supporting some clients on a voluntary basis.

Those motivations are important to consider when recruiting volunteers and when determining volunteering options and the duration of engagement.

Added to those motivations, the mentioned functions of volunteering also come into focus, especially personal values and experiences that drive people to volunteer:

You know, I’ve always been an outsider. I got teased by other kids and grew up in difficult conditions. Therefore, I’ve always wanted to help people who are vulnerable.

In our sample, factors driving volunteer work amongst retirees were based on intrinsic motivation (e.g. having a positive impact on our world, social responsibility), contextual embeddedness (e.g. family responsibilities and health restrictions), the enhancement function (e.g. coming to terms with oneself), the social function (e.g. being asked by other people to help), the protective function (e.g. feeling bad for not helping) and the desire for social justice. While several interviews stated that their volunteer work was independent from their social network others stated that their volunteer engagement was impacted by role models within their social network:

Volunteer work is a fixed component in my family. [...] This definitely influenced me, of course. Let's say, there are role models.

On the contrary, lacking acceptance or support for volunteer work within one's social networks is also described as a deterrent for volunteering:

[...] some of my friends' husbands said, they don't want their wives to volunteer.

Additionally, the understanding function (e.g. getting to know oneself better) is identified as a relevant function, for retirees are liable to seek out new challenges in life:

Doing something new in retirement would be interesting, because even at 60 you can still do a variety of things.

The willingness to volunteer seems to have risen in response to situations with an obvious need for helping hands, such as during the COVID-19 crisis, but often meets certain restraints:

I would really like to volunteer again, actually. But due to the corona virus it is not possible for me, it is too dangerous and with my diseases I am part of the risk group.

Fear, uncertainty and self-protection due to COVID-19 were only a few reasons why retirees in our sample reported wanting to avoid their established or new forms of volunteer work. In that situation, understanding the motivational factors of potential volunteers in the baby boomer generation can support volunteer managers with recruiting but also with engaging and retaining volunteers under so-called "normal" social conditions. It can also clarify how fragile the system is under circumstances such as social distancing and the overriding focus on protecting older adults and other vulnerable people. Those circumstances demand well-established management processes, such as those derived from the group socialisation model, for a culture of appreciation, positive feedback loops, trust and good relations between volunteer organisations and volunteers themselves often depends on physical, face-to-face interactions.

5. Discussion and Conclusion

Although the landscape of volunteering in Tyrol is well-established, the core, traditionally organised volunteer sector has shown some friction and fragility during the COVID-19 pandemic. Considering those trends, we have organised our results into two dimensions: general insights into volunteer management and dimensions specific to COVID-19.

5.1. General insights into volunteer management

Motivations for engaging in volunteer work found in our study largely match findings reported in the literature. It is also identified in our study that past experiences have been described as a key determinant for engaging in volunteer work during retirement (Ehlers et al., 2011; Niebuur et al., 2018). We further identified the six chief functions of the functional approach (Clary & Snyder, 1999; Snyder et al., 2000) as being important, except for the career function. Interviewees never mentioned that function, perhaps because motivations typically change over the life course and because career-related ones are less relevant to retirees than to younger people (Okun & Schultz, 2003).

At the same time, against the findings from the meta-analysis performed by Okun and Schultz (2003), several interviewed retirees stated that their volunteer work was entirely independent of their social network. Nevertheless, the lack of acceptance of volunteer work in one's social network was identified as a restricting factor for volunteer work by interviewees as well as by participants in Pavelek's (2013) study. Incentivising factors mentioned by interviewees, by contrast, include the motivation to make a positive difference in the world, a sense of social responsibility,

past personal experience with volunteering and awareness of the respective issue addressed by the specific volunteer work.

Because rates of intrinsic motivations for volunteer work are high, recruitment does not seem to be the major problem. Nevertheless, some experts proposed offering trial runs for potential volunteers or having volunteering role models and ambassadors (e.g. politicians, family members, companies and peer volunteers) to raise awareness for volunteer work. Even then, maintaining engagement continues to be difficult and critically needs a well-organised onboarding process. On top of that, showing appreciation for volunteers and acknowledging their valuable work with, for example, non-monetary rewards or professional mentoring opportunities for volunteers should be common practices. Compensating volunteers for costs that arise during volunteer work or providing volunteer insurance are additional ways to enhance the process of volunteer management.

Other common deterrents for volunteering are the health impairments of potential volunteers (Ehlers et al., 2011; Pavelek, 2013). Our sample reported such impairments, especially among the 70–79-year-old age group, in a result confirmed by the Austrian volunteering survey (IFES, 2016). Those circumstances prompted us to identify the second dimension of our findings.

5.2. Understanding volunteer management specific to COVID-19

The COVID-19 pandemic has forced governmental and non-governmental welfare providers alike to maintain only a minimum of social services, while some services have had to be entirely cancelled (Amadasun, 2020; Carlsen et al., 2020; Comas-Herrera et al., 2020). Women (Power, 2020) and vulnerable groups have been hit disproportionately harder by the effects of the pandemic (Kittel et al., 2020; Murphy & Wyness, 2020; Pieh et al., 2020; Traunmüller et al., 2020a), which has provided even more reasons to mobilise volunteers in response. However, though retirees and people about to retire are available in sufficient numbers, they have also been identified as the most vulnerable group to health-related risks due to COVID-19 (Powell, Bellin, & Ehrlich, 2020). In the course of the interviews, it became obvious that flexibility with time and self-determination are highly valued by baby boomers, as consistent with other findings indicating project-based volunteer work as a possible response to that development (Hansen & Slagsvold, 2020; McLennan et al., 2016).

An essential way for taking those considerations into account is by adapting e-volunteering tools, especially amid the COVID-19 pandemic, as digital opportunities for volunteer work are sorely lacking in Tyrol. Also known as online volunteering and virtual volunteering, e-volunteering is a diversified way of helping that offers the flexible possibility of volunteering online from home (Kramer, Lewis, & Gossett, 2013) and therefore reduces travel times and costs. The time-saving aspect may seem especially appealing to the baby boomer generation, whose time tends to be occupied. It might also reduce barriers for older adults living in rural areas with limited mobility (Esmond, 2001) and opens up the possibility of including people with disabilities (Lachance, 2020). Nevertheless, Smith, Stebbins, & Grotz (2017) have argued that the absence of social and emotional contact with others may severely limit the appeal and impact of in-person volunteering. Onyx and Warburton (2003) have also found that volunteering roles performed face to face have the strongest positive effects on volunteers. Despite those findings, e-volunteering has gained significant attention due to the COVID-19 pandemic and can have positive outcomes for volunteer management and volunteers while continuing to respect imposed measures for social distancing (Lachance, 2020). Even if e-volunteering at some point becomes exclusive due to the requirements for hardware and infrastructure, it bears the potential to relieve other areas in social services, because online support can be provided flexibly and just in time.

Last, the retirees and people about to retire in our sample showed special interest in using their professional skill set in volunteer

work. Given that interest, in times of crises the welfare system and the volunteer sector could extend classic volunteer management strategies by adding online-based *crowdtasking*, defined as the management of qualified volunteers in order to obtain specific skill sets, information or support (Middelhoff et al., 2016; Neubauer et al., 2013; Orloff, 2011) to manage and handle critical situations. Combining classic volunteer management with e-volunteering and aspects of *crowdtasking* could serve to establish a resilient system of volunteer work that is well-equipped for transforming society and especially suited for critical situations. In the wake of the pandemic and focusing on volunteering in health care, Radbruch et al. (2020, p.1467) suggest “enlisting informal networks of community-based and faith-based organisations to mobilise and train a citizen volunteer workforce that is ready and able to teleconnect with patients in need of basic social support, delivering on palliative care’s cornerstone feature – compassionate care”. Nakagawa et al. (2020, p.1683) outline the benefits of a “virtual consultation model staffed by out-of-state palliative care specialist volunteers” to support the medical care structure of regions under severe pressure caused by the pandemic. Nevertheless, even before the pandemic, Chirico et al. (2021) found in 2019 a higher prevalence for a burnout syndrome among Italian volunteers of the Red Cross. They conclude that volunteers from emergency care are at higher risk than volunteers involved in non-healthcare, social and administrative activities. Based on a review of literature on mental health of all kinds of volunteers after working in disasters, Thormar et al. (2010) additionally point out that volunteers show more signs of stress compared to professionals, indicating the need of a well-organized structure of volunteer management containing offers of training, practice, follow-up care and social support. The current experiences during the pandemic and the scientific findings urge the necessity for thinking about structural changes to establish a more efficient and resilient volunteer management in Tyrol.

Amongst our study’s limitations, the results and insights presented herein are based on qualitative data, because generalisation was not our primary aim. On the contrary, we wanted to illustrate how social benefits, even under rural and traditional structures, can arise in the course of demographic change. In response to those changes, including baby boomers in formal volunteer work, it seems to be a feasible strategy that currently lacks in sufficient, resilient management tools, which has become particularly evident under the influence of the COVID-19 pandemic.

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7. Competing interests



The authors declare that they have no competing interests.

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UDC classification: 658.8

JEL Classification: L25, M30

Consumer Orientation and Competitor Awareness on Firm Performance in the Bottled Water Industry

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Purpose: To assess the influence of strategic positioning indicators namely customer orientation and competitor awareness on firm performance in the bottled water industry, with sector standards as a moderating variable.

Design/Method/Approach: This study adopted a quantitative methodology and cross-sectional explanatory study design of which a sample of 424 licensed bottled water firms were randomly selected. Structured questionnaires were distributed to the managers and a factor analysis was used to reduce the number of variables and establish the underlying constructs, while the analysis of moments of structures was applied to develop theory.

Findings: It was found that there exists a positive and significant relationship among consumer orientation and competitor awareness on firm performance. The moderating effect of water sector standards on consumer orientation and firm performance was found to be statistically significant and operates fully or in part as a mediating variable in predicting the influence of competitor awareness on firm performance.

Theoretical Implication: This study concluded that to enhance firms' performance measured in terms of growth, there is need to manage and sustain consumers' needs based on gender and age preferences, buying behavior as well as conducting market analysis and have internal capability to retaliate.

Originality/Value: This study will not only add value to the existing body of knowledge in strategic management, but will also address the application of strategic position to improve firm performance.

Research Limitations/Future Research: Since the study was quantitative, there was risk of omitted variable and nonresponse bias, limited access to performance data and lack of previous research on the subject. Future research should extend to other categories of firms which have diverse decision processes and purchase intentions amongst consumers.

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Орієнтація на споживача і поінформованість конкурентів про результати діяльності фірм в галузі виробництва бутильованої води

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Мета роботи: Оцінка впливу показників стратегічного позиціонування, а саме орієнтації на клієнта і обізнаності про конкурентів, на результати діяльності компаній в галузі бутильованої води, з використанням галузевих стандартів як регулюючої змінної.

Дизайн/Метод/Підхід дослідження: У цьому дослідженні була використана кількісна методологія і крос-секційний пояснювальний дизайн, з якого випадковим чином було відібрано вибірку з 424 ліцензованих компаній з виробництва бутильованої води. Структуровані анкети були поширені серед менеджерів, і для зменшення кількості змінних і встановлення базових конструкцій використовувалася факторний аналіз, в той час як аналіз моментів структур застосовувався для розробки теорії.

Результати дослідження: Було виявлено, що існує позитивний і значущий взаємозв'язок між орієнтацією на споживача і обізнаністю конкурентів про результати діяльності компаній. Було встановлено, що регулюючий вплив стандартів водного сектора на орієнтацію на споживача і результати діяльності фірм є статистично значущим і діє повністю або частково як посередницька змінна при прогнозуванні впливу обізнаності конкурентів щодо результатів діяльності фірм.

Теоретична цінність дослідження: У цьому дослідженні зроблений висновок про те, що для підвищення ефективності компаній з точки зору зростання необхідно управляти і підтримувати потреби споживачів на основі гендерних і вікових переваг, купівельної поведінки, а також проводити аналіз ринку і мати внутрішні можливості для заходів у відповідь на дії конкурентів.

Оригінальність/цінність дослідження: Це дослідження не тільки підвищить цінність існуючої сукупності знань в області стратегічного управління, але також розглядає питання про застосування стратегічної позиції для поліпшення результатів діяльності фірми.

Обмеження дослідження / Майбутні дослідження: Оскільки дослідження було кількісним, існував ризик помилки в обліку змінних і неотримання відповідей, обмежений доступ до даних про продуктивність і відсутність попередніх досліджень з цього питання. Подальші дослідження слід поширити на інші категорії фірм, у яких різні процеси прийняття рішень і купівельні наміри серед споживачів.

Тип статті: Емпіричний

Ключові слова: аналіз ринку, галузеві стандарти, стратегічне позиціонування.

Ориентация на потребителя и осведомленность конкурентов о результатах деятельности фирм в отрасли производства бутылированной воды

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Цель работы: Оценка влияния показателей стратегического позиционирования, а именно ориентации на клиента и осведомленности о конкурентах, на результаты деятельности компаний в отрасли бутылированной воды, с использованием отраслевых стандартов в качестве регулирующей переменной.

Дизайн/Метод/Подход исследования: В этом исследовании использовалась количественная методология и кросс-секционный пояснительный дизайн, из которого случайным образом была отобрана выборка из 424 лицензированных компаний по производству бутылированной воды. Структурированные анкеты были распространены среди менеджеров, и для уменьшения количества переменных и установления лежащих в основе конструкций использовался факторный анализ, в то время как анализ моментов структур применялся для разработки теории.

Результаты исследования: Было обнаружено, что существует положительная и значимая взаимосвязь между ориентацией на потребителя и осведомленностью конкурентов о результатах деятельности компании. Было установлено, что регулирующее влияние стандартов водного сектора на ориентацию на потребителя и результаты деятельности фирм является статистически значимым и действует полностью или частично как посредническая переменная при прогнозировании влияния осведомленности конкурентов о результатах деятельности фирм.

Теоретическая ценность исследования: В этом исследовании сделан вывод о том, что для повышения эффективности компаний, измеряемых с точки зрения роста, необходимо управлять и поддерживать потребности потребителей на основе гендерных и возрастных предпочтений, покупательского поведения, а также проводить анализ рынка и иметь внутренние возможности для ответных мер.

Оригинальность/ценность исследования: Это исследование не только повысит ценность существующей совокупности знаний в области стратегического управления, но также рассматривает вопрос о применении стратегической позиции для улучшения результатов деятельности фирмы.

Ограничения исследования / Будущие исследования: Поскольку исследование было количественным, существовал риск ошибки в учете переменных и неполучения ответов, ограниченный доступ к данным о производительности и отсутствие предыдущих исследований по этому вопросу. Дальнейшие исследования следует распространить на другие категории фирм, у которых разные процессы принятия решений и покупательские намерения среди потребителей.

Тип статьи: Эмпирический

Ключевые слова: анализ рынка, отраслевые стандарты, стратегическое позиционирование.

1. Introduction

According to sustainable development goal number six, clean and accessible water for all is essential. World Health Organization (WHO, 2018) reported that the safety and accessibility of drinking-water are major concerns throughout the world with only 40 % of Kenyans accessing to safe clean drinking water in 2005. To ensure that water is safe for human consumption, it is often filtered and treated at a cost to meet the set international (WHO, FDA, CODEX) and national (KEBS) regulations for acceptance into the market. Due to the minimal barrier of entry to the bottled water industry, there is cut throat competition among firms to enhance their market position majorly in price, leadership, location, marketing and distribution. Therefore, firms need to understand their strengths to remain afloat as they cope with set standards. Nevertheless, according to KEBS (2019) there were 157 water firms in Kenya carrying out operations having no certification to confirm the quality of water sold hence compromising the safety of bottled drinking water (WASREB, 2008).

According to Sair et al. (2014), timely executed firm positioning can help build a powerful brand image in customers' minds. However, in case the positioning fails to resonate, due to changes in customer preferences, new market entrants or structural changes in the target market, a company may opt to reposition. This involves a deliberate attempt to change a customer's view of a product or brand. Repositioning a business is more than a marketing challenge as it involves decisions on how markets shift and competitors react to these changes. Initially, strategic positioning was used to describe how different firms configured their products, price, place, and promotion to attract customers in specific market segments in order to achieve market dominance and make superior profit margins (Bergkvist, & Bech-Larsen, 2010). Since bottled water will continue to do well in the global market as a substitute to carbonated soft drinks, gains in the bottled water market will also come from flavored varieties and convenient package formats. The major challenge for most bottled water companies will be product innovation and differentiation (Kusi, Agbeblewu, & Nyarku, 2015). Under increasing competitive pressure, firms seek strategies to differentiate themselves and their products in order to achieve distinction from their competitors. Consequently, establishments need to scan continuously their external and internal environments for threats and opportunities, and then develop requisite skills to enhance their strategic vision. According to Jia (2015), every business should analyze its resources and capabilities to ascertain its competitive advantages and make choices selectively, determine the enterprise boundary and work out its own strategic positioning. Charlotte (2013), Sanjay (2014) and Shah, Gao, & Mittal (2015) noted that with the rise of domestic consumption, the popularization of products, sophistication of people's consumption priorities and the role of branding were increasingly significant in product differentiation. Hlatshwayo (2015) found that there was a greater need for brand positioning in small and macro enterprises as a marketing framework in growing and sustaining business-to-consumer. The minimum requirement for the target market brands should be strongly associated with the local brand market leader which, in most cases, is technologically sophisticated, trusted, and prestigious (Mentz, Strydom, & Rudansky-kloppers, 2012).

In Kenya, firms compete for several strategic positioning approaches including consumers' involvement in their daily operations and customers' willingness to deal with the technical complexities that arise in their quest for service (Onguko, & Ragui, 2014). They established that well positioned firms were perceived to be closely aligned to the needs of both current and emerging target markets. The effect of positioning strategies on performance was found to lead to improvement in consumer brand loyalty, customer satisfaction, market share and eventually growth in profitability. Thus, there is need to assess the influence

of consumer orientation and competitor awareness on firm performance.

2. Theoretical background

2.1. Theoretical literature

Stakeholder theory was adopted to explain the influence of consumer orientation on firm performance. According to this theory, as stakeholders contribute to the organization, they expect their interests to be met (Wagner Mainardes, Alves, & Raposo, 2011). Subsequently, Harrison, & Wicks (2013) emphasized on the need for shareholders to maximize their return on investment as they weigh the effectiveness of their investments, while consumers' satisfaction is enhanced by their perception. In this study, consumers are portrayed as the major stakeholders in the bottled water industry. The purpose of firms is to satisfy the consumer of which without them they cannot survive. Since consumers may choose to take business to a competitor, it is essential that firms continue to innovate, offer up to date products and find value for money (Zachariev, 2002; Reddy & Reddy, 2014). Therefore, understanding consumers' expectations and delivering quality products bodes well in building a loyal customer base (Ramya & Ali, 2016).

According to Porte (2008), market competition goes beyond the initial players to potential entrants, rivalry by substitutes and suppliers grounded on underlying economic structures. Firms with similar products and services aimed at the same customer group will always be in competition. The extent of rivalry in industries is observed where competitors of an equal size try to dominate each other and in less rivalry industries, there may be one or two dominant firms with smaller firms focusing on niches to avoid attention. In times of strong growth, a firm may develop with the market whilst a decline in growth comes at the expense of competitors. Low growth is identified with low profitability and low price competition thus firms should focus on both short term and long term factors that affect competition by examining the firms' strategic decisions, conducting market intelligence and competitive analysis (Gebhardt, Farrelly, & Conduit, 2019). Hence, in this study, Industry analysis and competition theory were applied to explain the influence of competitor awareness on firm performance in that, by understanding the competitive forces, a firm can among others: highlight its critical weakness and strengths, identify its position in the industry, animate extents where strategic adjustment is beneficial and help in forecasting threats and opportunities.

In this study, the influence of sector standards was anchored on Agency Theory. To manage the conflict arising from the interest of firms, sector standards are inevitable (Mohammed, 2013). Whereas firms seek to maximize their return on investment, the state is charged with the duty of making sure that the infrastructure care is well maintained, public safety is guaranteed and the legislative body of government is responsible for the formulation of laws. The state also takes care of public goods which are non-rivalrous and non-excludable. In this study, agency problems will arise as the state attempts to set standards for firms (Panda, & Leepsa, 2017).

2.2. Empirical literature

Azigwe et al (2016) found that business competitive environment becomes increasingly fierce, industry players need to nurture and keep loyal customers who contribute to their profitability and long-term growth. Belás & Gabčová (2016) and Khadka, & Maharjan (2017) found that customers were the link to business success and organizations should focus on consumer satisfaction and loyalty. Their findings further revealed that the service level of a firm can be marked as positive when consumers are satisfied with the service. However, improvement on service regarding a feedback system, staff training as well as a regular advertising campaign attract new consumers and also inform existing customers (Mwai et al, 2017; Zhang, 2017). Colman,

Devinney, & Midgley (2019) examined the impact of customer relationship management (CRM) on firm performance using a hierarchical construct model. Using the resource-based view (RBV) of the firm, they revealed a positive and significant path between superior CRM capability and firm performance. This study therefore hypothesized that there is a relationship between consumer orientation and firm performance in the bottled water industry in Kenya.

Agha, Atwa, & Kiwan (2015) investigated the impact of strategic intelligence and its dimensions namely: foresight, visioning, and motivation in explaining the influence of competitor awareness on firm performance. They examined the mediating role of strategic flexibility on marketing and competitiveness in firms and concluded that there was a significant positive relationship between strategic intelligence and flexibility on firm performance. These results were in agreement with Levine, Bernard, & Nagel (2017). According to Anwar, Shah, & Hasnu (2016), the relationship of strategy-performance linkages is central in strategic management and competitor awareness as they positively impact firms' performance. It is in light of these findings that this study hypothesized that there exists a relationship between competitor awareness and firm performance in the bottled water firms.

Siami-Namini (2015) reported that free market is guided by an invisible hand and fewer sector standards could be efficient. The study further advanced Adam Smith's thought on sector standards in the economy but disagreed with all disturbing factors that destroyed the equilibrium in a free market. With too many sector standards in a free market, consumers expect to see many monopolies in the economy. Eniola, & Entebang (2015) found that the evolution of small and medium enterprises was mostly bounded by the existence of laws, ordinances, and rules and had a major impact on competitiveness. Patel, & Chaikof (2016) reported that sector standards highly controlled by the government had effectively improved innovation performance. Strong government intervention led to the concentration of resources in selected sectors to relevant players. Whereas, industry innovation in Hong Kong was mostly self-financed and less directed by the government, it was established that the government was the main determinant for innovation capacity although its role and degree of involvement in innovation was debatable (Wang, Yang, & Xue, 2017). Sector standards were also vital in supporting R&D and innovation as the market alone did not provide adequate incentives. The degree of intervention, however, varied in different economies and ranged from directive intervention (actively advising industrial policy and investing in selected areas) to facilitative intervention which entailed creating positive environment and providing public goods for industry (Peter, James, & Timothy, 2016). This study therefore hypothesized that sector standards have a moderating as well as mediating effect on the relationship between consumer orientation and competitor awareness respectively on firm performance in the bottled water industry in Kenya. Selvam et.al. (2016) gave a comprehensive subjective measurement model for the performance of firms, based on profitability, growth, market value performance of the firm, customer satisfaction, employee satisfaction, environmental audit performance, corporate governance performance and social performance. They found that these nine determinants cannot be used interchangeably since they represent different aspects of firm performance and different stakeholders of firms have different demands that need to be managed independently.

3. Research questions

The research questions the study sought to answer were:

- How does consumer orientation influence firm performance in the bottled water industry in Kenya?
- How does competitor awareness influence firm performance in the bottled water industry in Kenya?

- How does water sector standards moderate the influence of consumer orientation on firm performance in the bottled water industry in Kenya?
- How does water sector standards mediate the influence of competitor awareness on firm performance in the bottled water industry in Kenya?

4. Data and methods

This study adopted positivist research philosophy with a mono-method quantitative approach. An explanatory design was applied and the target population comprised all the 840 licensed and active bottled water manufacturing companies in Kenya in the year 2019. A simple random sampling procedure was used to obtain the sample and the sample size was computed using the finite population method (Njiri et. al., 2021). The formula used was:

$$n_0 = \frac{z\alpha/2(1-\pi)\pi}{\epsilon^2} \quad (1)$$

This study proposed a 95% confidence, and at least 5 percent plus or minus precision (ϵ). This resonated to Z values of 1.96 per the standard normal table. For maximum variability, the proportion π was taken as 0.5. Therefore, the sample size for this study was:

$$((1.96)^2 (0.5) (0.5)) / (0.05)^2 = 385.$$

To factor in non-response, the sample size was inflated by 10% leading to 424. The variables of consumer orientation, competitor awareness, water sector standards and company performance were construed by indicators on a Likert scale, with not at all coded (1), small extent was coded (2), moderate extent (3), great extent (4) and very great extent was coded (5). Content validity and criterion related validity were ascertained and items of reliability were checked using the Cronbach alpha coefficient. Factor analysis was used to identify the latent factors that were inherent in the observed variables (Berk, 2016). A principal component analysis was used to collapse a large number of items into fewer interpretable factors by extracting maximum variance. Similar items were combined to come up with constructs (sub-themes). The analysis of moments of structures was used to ascertain if the items in the survey lined up with the construct and to compare the measurement model with the structural model in order to build up a theory. The assumptions of multicollinearity, multivariate normality with no outliers and homoscedasticity were checked.

5. Results

Out of the 424 questionnaires distributed to the strategic managers of bottled water firms in Kenya, 345 were adequately completed representing 81.4% percent response rate. This response rate was deemed satisfactory as suggested by Sekaran & Bougie (2016) who recommends 75 percent as a rule of thumb for minimum responses. Since the data were on a Likert scale, the normality assumption was assumed to be observed. The multivariate outliers were examined using the Mahalanobis Distances at probability values of less than .001 to the right-tail of the chi-square distribution (Dai, 2020). 58 cases reported the Mahalanobis distance of more than 90.57866 with the probability of less than 0.001, hence they were treated as outliers. Prior to running inferential analyses, the outliers were removed and 287 cases were retained. All the Variance Inflation Factors (VIF) were less than 10 and all tolerance was greater than 0.01, thus the assumption of multicollinearity was met as recommended by Bruce (2021). To test for Homoscedasticity, a loess fit line was fitted to the residuals. The loess line was relatively straight as indicated in Fig. 1. Thus, the data did not violate the assumption of homoscedasticity (Härdle, & Simar, 2015).

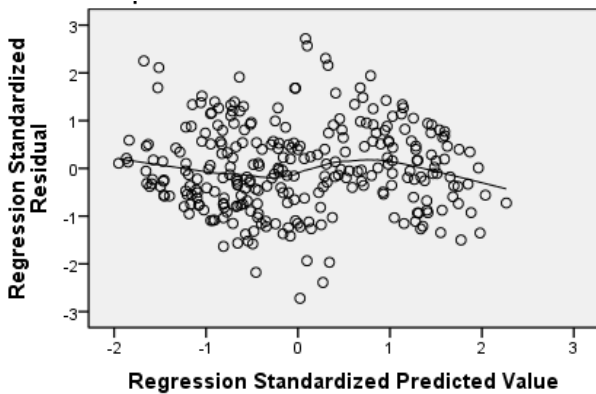


Figure 1: Scatter plot for standardized residuals and standardized predicted value

Source: developed by the author.

Another assumption of homoscedasticity is that the variance of any of the measured variables should not be more than 10 times greater than any other variable variance. In this study, all variables reported the variances of between 0.312 and 2.12, thus there was no extreme variance to be deleted.

Consumer orientation was measured using seven items on a 5-point Likert scale. The reported reliability for all the items was 0.799. The KMO results and Bartlett's test reported the Chi-square value of 920.553 with P less than 0.001. A principal component analysis retained five items namely: consumer needs, buying habits, preferences by age and consumers preferences by gender. The items removed were product customization, preference by income and rate of satisfaction. The explanatory power of the four items retained is presented in Tab. 1 with constrained estimates, where the strongest loaded measurement was given a unit weight. Consumer buying habits had the highest explanatory power followed by consumer needs, then level of preferences by gender and finally consumer preferences influenced by age. All these items were significant with P values of less than 0.001.

Table 1: Regression weights for the measurement model for consumer orientation

	Estimate	S.E.	C.R.	P
Consumer needs	.952	.095	10.010	***
Buying habits	1.000			
Preference by age	.630	.098	6.457	***
Preference by gender	.636	.100	6.378	***

Source: completed by the author.

The principal component analysis extracted two subthemes that had Eigen values greater than 1.0. The two subthemes accounted for 34.497% and 31.269 of the variance respectively with a total variance of 65.766 %.

Competitor awareness was construed using ten, 5-point Likert scale items. The reported reliability for these items was 0.568 with KMO and Bartlett's test statistics reporting the Chi-square value of 2074.120 (0.858) with P less than 0.001. A factor analysis retained eight significant items as measures of competitor awareness. These items were market share, capacity to retaliate, internal capability, pricing strategies, market intelligence analysis, market coverage, meeting internal and external expectations. The items deleted were product differentiation and mentions in the media. The explanatory power of these eight items is presented in Tab. 2 with unit constrained estimates. Capacity to retaliate reported the highest explanatory power followed by a market intelligence analysis, internal capability, market share and pricing strategies in that order. However, market coverage, internal and external expectations reported negative weights. Overall, all these items were significant of which their corresponding P values were all less than 0.001.

Table 2: Regression weights for items in the measurement model of competitor awareness

Items	Estimate	S.E.	C.R.	P	Label
Market share	.801	.054	14.778	***	Significant
Capacity to retaliate	1.000				
Internal capability	.976	.058	16.820	***	Significant
Pricing strategy	.759	.064	11.771	***	Significant
Market analysis	.982	.071	13.794	***	Significant
Market coverage	-.914	.085	-10.704	***	Significant
Internal expectation	-.988	.097	-10.206	***	Significant
External expectation	-.876	.089	-9.798	***	Significant

Source: completed by the author.

Two components had Eigenvalues greater than 1.0, hence two subthemes were extracted. The two subthemes accounted for 38.3 % and 30.3% of the variance respectively with a total variance of 68.663 %. On how often firms conduct a competitor analysis- 5.1% of the respondents reported monthly, 22.4% quarterly, 26% bi-annually and majority (40%) reported annually.

Water sector standards (the moderating variable) was measured using 13 items on a 5-point Likert scale. The reported reliability for the instruments was 0.739 with the KMO results and Bartlett's test reporting a Chi-square value of 1865.493 (0.786) with P less than 0.001. A principal component analysis was applied to extract communalities of which a threshold of 0.6 was set (James et al 2013). Eight items retained were tax relief standards, employment policies, standards on infrastructure-access, compliance, licenses and approvals by the ministry of industrialization, compliance and approvals by the county public health, compliance and clean bill from the National Environment Management Authority, employees' standards per trade unions and invitation of regulatory bodies for inspection. The explanatory power of these eight items are presented in Tab. 3. The item with the highest explanatory power with a unit constrained estimate was the invitation of regulatory bodies for inspection followed by compliance with the National Environment Management Authority. Tax relief had the third explanatory power, then employees attaining the trade unions standards, compliance with county public health, approvals by the ministry of industrialization, minimum wage employment policy and infrastructure access.

Table 3: Regression weights of items in the measurement model for water sector standards

	Estimate	S.E.	C.R.	P
Tax standards	.688	.083	8.259	***
Employment policy	.395	.074	5.357	***
Infrastructure access	-.054	.064	-.849	.396
Approvals by ministry	.465	.044	10.510	***
Approvals by Public Health	.517	.049	10.483	***
Compliance with NEMA	.822	.073	11.338	***
Trade union standards	.716	.085	8.380	***
Inspection by regulatory bodies	1.000			

Source: completed by the author.

Six items were significant and positively explained water sector standards, apart from infrastructure access which had a negative coefficient but not significant as reported in Tab. 3.

Company performance was construed using 20 items measured in a 5-point Likert scale. The reported reliability for these items was the Cronbach alpha value of 0.864 which surpassed the threshold value of 0.7. The KMO test statistic reported a value of 0.878 (Chi-square 2912.227) and the Bartlett's test results had P value of less than 0.001. Eleven items were retained from a factor analysis. The items retained were a satisfactory profit growth rate, sales growth, increase in the number of employees, returns from assets, returns from borrowed money, expansion in size, considerable improvement in quality, net operating profit after tax, total assets owned by the company, number of existing staff in the company and staff attrition. The nine items removed were sufficient capital, having more outlets, increase in customer acquisition, increase in market share, timely delivery of products, increase in suppliers, launch of new products, number of existing consumers and

customer growth.

The explanatory power of the eleven items retained are presented in Tab. 4 with unit constrained estimates, where the satisfactory profit growth rate reported the highest explanatory power. The increase in the number of employees reported the second highest explanatory power followed by the company expansion in size, then satisfied returns from borrowed money, returns from the assets invested, improved quality of the products, registered sales growth, number of staff who had left, number of existing staff in the company, net operating profit after tax and total assets owned by the company in that order. All these items were significant with P values less than 0.001 apart from net operating profit after tax and total assets owned by the company.

Table 4: Regression weights of items in the measurement model for company performance

	Estimate	S.E.	C.R.	P
Profit growth (CPF2)	1.000			
Sales growth (CPF3)	.827	.059	14.073	***
Increase in employees (CPF4)	.938	.062	15.135	***
Returns from asset (CPF6)	.860	.059	14.517	***
Returns from borrowed money (CPF7)	.864	.059	14.748	***
Expansion in size (CPF11)	.923	.061	15.145	***
Improved quality of the products (CPF12)	.882	.064	13.713	***
Net operating profit (CPF15)	.058	.045	1.286	.198
Total assets (CPF16)	.054	.053	1.031	.303
Number of staff (CPF17)	.321	.076	4.229	***
Number of staff who have left (CPF18)	.732	.088	8.332	***

Source: completed by the author.

In this study, the first null hypothesis (hypothesis one) was that there is no relationship between consumer orientation and firm performance in the bottled water industry in Kenya. To test this hypothesis, a structural model relating consumer orientation and firm performance was fitted as illustrated in Fig. 2. From Tab. 5, the

probability of getting a critical ratio of 11.397 in absolute value for age (ccc4) as a measure on consumer orientation was less than 0.05. Thus the regression weight for age was significant (Beta = 1.005, CR = 11.397, P<0.05).

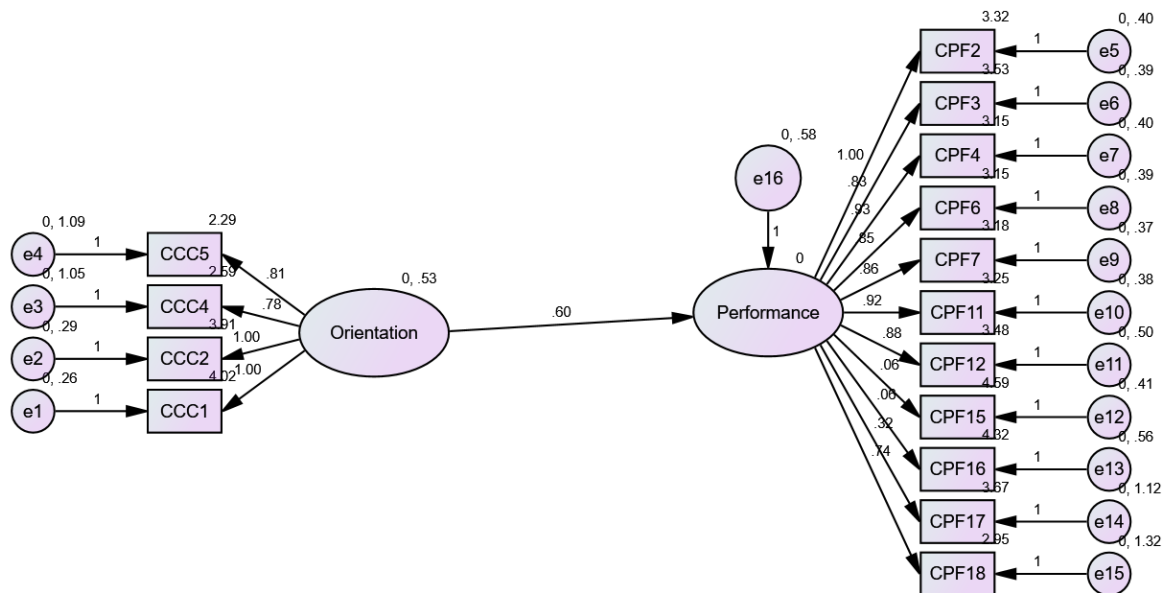


Figure 2: Structural model relating customer orientation and Firm Performance

Source: developed by the author.

Likewise, buying habits was less than 0.05. The regression weight for buying habits when predicting consumer orientation and consumer needs reported a significant relationship. The overall relationship between consumer orientation and firm performance was found to be significant (Beta = 0.601, P<0.05). The four indicators had 49.6% variation on consumer orientation. The marginal effect of consumer orientation was 0.601% implying that

an increase in consumer orientation by 0.607 would improve firm performance by 1%.

From Tab. 6, the probability of getting a critical ratio of 14.337 in absolute value for sales growth was less than 0.05. Thus the regression weight of sales when predicting company performance was significant (Beta = 0.834, CR=14.337, P<0.05). Consequently,

the increase in the number of employees, return on assets, return on borrowed money, expansion in size, quality of products and

attrition rate registered positive and significant relationship. Net profit after tax and total company assets were not significant.

Table 5: Statistical test of the structural model for consumer orientation

Construct	Item	Structure Models				Remark
		Coefficient factor (Standardized)	SE	CR	P value	
Consumer Orientation	Preference by gender (ccc5)	1.000				
	Preference by age (ccc4)	1.005	.088	11.397	***	Significant
	Buying habits (ccc2)	.781	.104	7.542	***	Significant
	Consumer needs (ccc1)	.808	.106	7.630	***	Significant
	(Joint)			R ² =0.496		

Source: completed by the author.

Table 6: Statistical test for a structural model for company Performance

Construct	Item/variable	Coefficient factor (Standardized)	SE	CR	P value
Firm performance	profit growth	1.000			
	sales growth	.834	.058	14.337	***
	increase in number of employees	.930	.062	15.097	***
	return on assets	.854	.059	14.483	***
	return on borrowed money	.859	.058	14.751	***
	expansion in size	.922	.061	15.239	***
	improvement in quality	.877	.064	13.720	***
	net profit after tax	.062	.045	1.375	.169
	total assets	.055	.053	1.047	.295
	number of staff	.322	.076	4.259	***
	attrition rate	.735	.087	8.415	***
(Joint)			R ² =0.58		

Source: completed by the author.

The second null hypothesis (Hypothesis two) was that there is no relationship between competitor awareness and firm performance in the bottled water industry in Kenya. The structural model relating to competitor awareness and firm performance was fitted as illustrated in Fig. 3.

The results are further illustrated in Tab. 7 which presents the structural coefficient factors. All the eight indicators were considered to be significant indicators of competitor awareness.

The indicators had 90% variation on competitor awareness. The structural model reported that the increase in competitor awareness by a factor of 0.704 resulted in an improvement of firm performance by 1% (Beta = 0.90, CR = 12.709, P<0.05). Overall, combining consumer orientation and competitor awareness when predicting firm performance reported positive and significant weights as reported in Fig. 4.

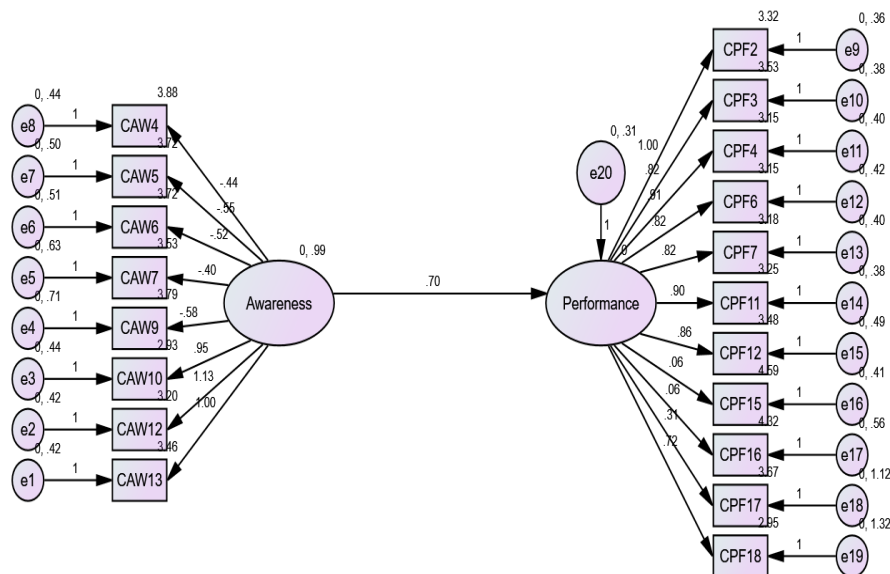


Figure 3: Structural model relating competitor awareness and firm performance

Source: developed by the author.

Table 7: Statistical test for a structural model for company performance

Construct	Variables	Coefficient factor (Standardized)	SE	CR	P value	Remark
Competitor awareness	External expectation (CAW13)	1.000				
	Internal expectation (CAW12)	1.127	.063	17.856	***	Significant
	Market coverage (CAW10)	-.951	.058	16.476	***	Significant
	Market analysis (CAW9)	-.577	.058	-9.994	***	Significant
	Pricing strategies (CAW7)	-.405	.052	-7.774	***	Significant
	Internal capability (CAW6)	-.521	.049	10.522	***	Significant
	Capacity to reiterate (CAW5)	-.549	.050	-11.051	***	Significant
	Market share (CAW4)	-.440	.045	-9.776	***	Significant
Joint		R ² =0.90				

Source: completed by the author.

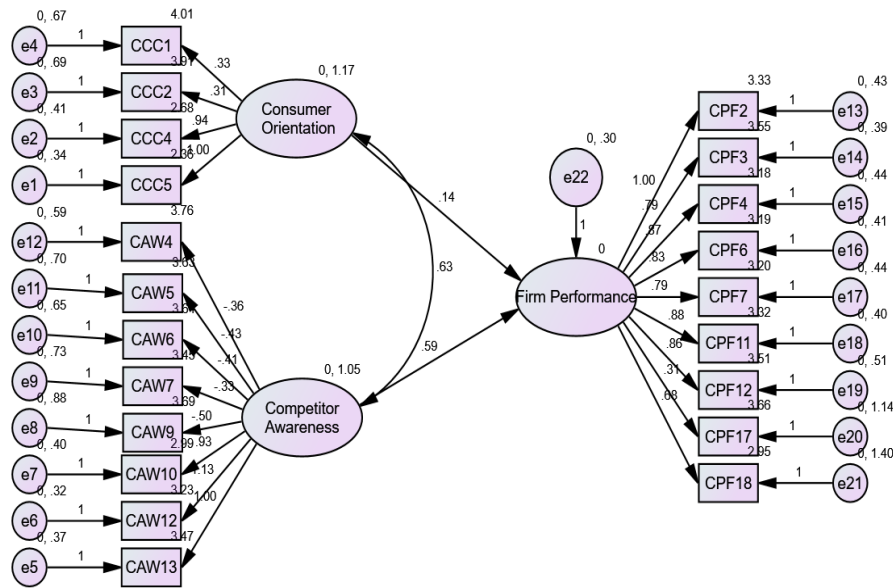


Figure 4 Structural model of consumer orientation, competitor awareness and firm performance

Source: developed by the author.

Consumer orientation reported a weight of 0.144, while competitor awareness reported a weight of 0.586. Thus competitor awareness had a more powerful explanatory effect comparing to consumer orientation.

The third hypothesis (Hypothesis 3) was that the moderating effect of water sector standards in the relationship between consumer

orientation and firm performance was not significant. Tab. 8 reports P value of 0.011 for the interaction effect. Since the P value was less than 0.05, the moderating effect of water sector standards on consumer orientation and firm performance was statistically significant ($p = 0.011 < 0.05$). Thus the null hypothesis was rejected.

Table 8 Statistical test for the moderating effect of water sector standards on consumer orientation and firm performance

Response	Predictor	Estimate	S.E.	C.R.	P
Z firm performance	Z for consumer orientation	.154	.049	3.119	.002
Z firm performance	Z for sector standards	.629	.049	12.851	***
Z firm performance	Interaction	.103	.041	2.533	.011

Source: completed by the author.

The fourth hypothesis (Hypothesis 4) was that the mediating effect of water sector standards in the relationship between competitor awareness and firm performance in the bottled water industry was not significant. Sobel statistic was applied (Shrout & Bolger, 2002) and reported ($Z = 6.6573294, P < 0.05$). Thus the study rejected the hypothesis.

6. Discussions

The two subthemes extracted from consumer orientation were demographic characteristics (age & gender) and Life style (consumer needs and buying habits). Feng et. al. (2019) reported that the relationship between consumer orientation and firm performance is far from clear. Partly because firm

performance may depend on certain internal or external factors. They concluded that it was harmful for firms to operate in a less competitive environment. The subthemes extracted from competitor awareness were strategic decisions and market share. Robert Baum, & Wally (2003) reported that fast strategic decision-making predicts a subsequent firm growth and profit and mediates the relation of centralization, dynamism, formalization and munificence with firm performance. These results were in agreement with Mwizerwa, Mulyungi, & Rukia (2018) who found that marketing strategies such as product quality, specification and packaging were significant elements in increasing product pricing. The period of payment and discounts offer were also found to be indicators of pricing strategy and they influenced the increase in

the market share.

The four subthemes extracted from the sector standards were strategic compliance with regulatory policies, compliance with statutory approvals, taxation standards and standards set for public spending and infrastructure incentives. Taouab, & Issor (2019) reported that due to ever changing environment, firms face severe competitive pressure to do things better and faster at lower prices. Consequently, putting sector standards in place is important, since companies are constantly seeking for effective and efficient results. The four subthemes extracted from firm performance were growth, development, profit and capital investment strategy. Al-Matari, Al-Swidi, & Fadzil (2014) revealed that different measures had been used by researchers to measure firm performance. They classified those measurements into market-based indicators and accounting-based. They concluded that performance measurement had great significance for the effective management of firms and the improvement of the processes since only measurable effects are manageable. From this study, it can therefore be inferred that water sector standards operate fully or in part in mediating between competitor awareness and firm performance.

7. Conclusion

This study concluded that to enhance firm performance in the bottled water industry, consumer needs, buying behavior, age and gender need to be considered for the firm to compete effectively in the market. The firm also needs to put in place strategic decisions informed by an intelligence analysis on its market share as well as having the capability to reiterate well thought price strategies. Concentrating on market coverage, internal and external expectations will negatively influence the firm performance. Consumers will opt for bottled water because of their aesthetic preferences and health concerns. Water sector standards especially on strategic compliance with regulatory and policies will influence firm performance. Consumers will favor a brand if they think that the quality is assured by set and maintained standards. Future research should extend to other categories of firms with varied decision procedures and buying intention amongst consumers.

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9. Competing interests

The authors declare that they have no competing interests.

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UDC classification: 338.28

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Управление отходами в контексте перехода к циркулярной экономике: кейс Казахстана

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Цель работы: Переосмыслить концепцию управления отходами в контексте перехода к циркулярной экономике, дать оценку, установить особенности и определить направления апробации зарубежного опыта в сфере управления отходами в Казахстане.

Дизайн/Метод/Подход исследования: Теоретический подход основан на обобщении существующих исследований, на материалах контент-анализа существующих современных источников в области циркулярной экономики. Исследование проведено путем отбора, систематизации фактов и данных, абстрагирования, обобщения для выявления проблем переработки отходов в Казахстане и поиска их решения.

Результаты исследования: Система управления отходами является одним из условий реализации «зеленой экономики», что обусловлено недостаточной степенью развитости практических подходов к теме переработки отходов производства и потребления. Одним из движущих факторов, способствующих эффективности функционирования системы управления отходами, является осознание и понимание теоретико-практической сущности и целей «зеленых» категорий, таких как циркулярная модель производства, технологии переработки, инструменты финансирования и пр. Все это направлено на разрешение проблем, связанных с загрязнением окружающей среды. Основными факторами, препятствующими развитию системы управления отходами, являются в большей степени внутренние факторы, в том числе личностные.

Теоретическая ценность исследования: Обосновано, что в Казахстане необходимо полное формирование системы управления отходами с учетом возможности использования мирового опыта и совершенствования практики действующего рынка сбыта вторичных ресурсов. Кроме того, рассмотрен вопрос актуализации деятельности информационных компаний по привлечению общественного внимания к этой проблеме.

Практическое значение исследования: Достигнутые результаты могут быть использованы в различных регионах Казахстана для привлечения внимания местных представительных органов, общественности на проблему управления отходами, являющуюся одной из важных составляющих циркулярной экономики в контексте развития «зеленой экономики».

Социальные последствия: Достижение определенных результатов в области рационального и эффективного управления отходами приводит к минимизации их отрицательного влияния на окружающую среду.

Оригинальность/Ценность исследования: Оригинальность статьи состоит в том, что в ней более системно рассматриваются проблемы слабого функционирования системы управления отходами на сегодняшний день.

Ограничения исследования/Перспективы дальнейших исследований: Перспективы дальнейших исследований связаны с продолжением анализа проблем формирования системы управления отходами и поиска путей их решения.

Тип статьи: Теоретический

Ключевые слова: циркулярная экономика, устойчивое развитие, система управления отходами, твердые бытовые отходы, региональные аспекты.

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Waste Management in the Context of Transition to a Circular Economy: the Case of Kazakhstan

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Purpose: To rethink the concept of waste management in the context of the transition to a circular economy, to assess, establish the features and determine the directions of testing foreign experience in the field of waste management in Kazakhstan.

Design/Method/Approach: The theoretical approach is based on a generalization of existing research, on the materials of content analysis of existing modern sources in the field of circular economy. Also, the study was carried out by selection, systematization of facts and data, abstraction, generalization to identify the problems of waste processing in Kazakhstan and search for their solutions.

Findings: The waste management system is one of the conditions for the implementation of the «green economy», which is due to the insufficient degree of development of practical approaches to the topic of processing production and consumption waste. One of the driving factors contributing to the efficiency of the waste management system is the awareness and understanding of the theoretical and practical essence and goals of «green» categories, such as a circular model of production, processing technologies, financing instruments, etc. All this is aimed at solving problems associated with environmental pollution. The main factors hindering the development of the waste management system are mostly internal factors, including personal ones.

Theoretical Implication: It has been substantiated that Kazakhstan needs a complete formation of a waste management system, considering the possibility of using world experience and improving the practice of the existing market for the sale of secondary resources. In addition, the issue of updating the activities of information companies to attract public attention to this problem was considered.

Practical Implications: The results achieved can be used in various regions of Kazakhstan to attract the attention of local representative bodies, the public to the problem of waste management, which is one of the important components of the circular economy in the context of the development of a «green economy».

Social Consequences: Achievement of certain results in the field of rational and effective waste management leads to minimization of their negative impact on the environment.

Originality/Value: The originality of the article lies in the fact that it considers the problems of the weak functioning of the waste management system today in a more systematic way.

Research Limitations/Future Research: Prospects for further research are related to the continuation of the analysis of the problems of forming a waste management system and the search for ways to solve them.

Paper type: Theoretical

Keywords: circular economy, sustainable development, waste management system, municipal solid waste, regional aspects.

Управління відходами в контексті переходу до циркулярної економіки: кейс Казахстану

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Мета роботи: Переосмислити концепцію управління відходами в контексті переходу до циркулярної економіки, дати оцінку, встановити особливості й визначити напрями апробації зарубіжного досвіду в сфері управління відходами в Казахстані.

Дизайн/Метод/Підхід дослідження: Теоретичний підхід заснований на узагальненні існуючих досліджень, на матеріалах контент-аналізу існуючих сучасних джерел в області циркулярної економіки. Дослідження проведено шляхом відбору, систематизації фактів і даних, абстрагування, узагальнення для виявлення проблем переробки відходів в Казахстані і пошуку їх вирішення.

Результати дослідження: Система управління відходами є однією з умов реалізації «зеленої економіки», що обумовлено недостатнім ступенем розвиненості практичних підходів до теми переробки відходів виробництва і споживання. Одним з рушійних чинників, що сприяють ефективності функціонування системи управління відходами, є усвідомлення і розуміння теоретико-практичної сутності та цілей «зелених» категорій, таких як циркулярна модель виробництва, технології переробки, інструменти фінансування тощо. Все це спрямовано на вирішення проблем, пов'язаних з забрудненням навколишнього середовища. Основними чинниками, що перешкоджають розвитку системи управління відходами, є більшою мірою внутрішні чинники, в тому числі особистісні.

Теоретична цінність дослідження: Обґрунтовано, що в Казахстані необхідно повне формування системи управління відходами з урахуванням можливості використання світового досвіду та вдосконалення практики чинного ринку збуту вторинних ресурсів. Крім того розглянуто питання актуалізації діяльності інформаційних компаній із залучення громадської уваги до цієї проблеми.

Практичне значення одержаних результатів: Досягнуті результати можуть бути використані в різних регіонах Казахстану для залучення уваги місцевих представницьких органів, громадськості на проблему управління відходами, що є однією з важливих складових циркулярної економіки в контексті розвитку «зеленої економіки».

Соціальні наслідки: Досягнення певних результатів в області раціонального і ефективного управління відходами призводить до мінімізації їх негативного впливу на навколишнє середовище.

Оригінальність/Цінність дослідження: Оригінальність статті полягає в тому, що в ній більш системно розглядаються проблеми слабкого функціонування системи управління відходами на сьогоднішній день.

Обмеження дослідження/Перспективи подальших досліджень: Перспективи подальших досліджень пов'язані з продовженням аналізу проблем формування системи управління відходами та пошуку шляхів їх вирішення.

Тип статті: Теоретичний

Ключові слова: циркулярна економіка, сталий розвиток, система управління відходами, тверді побутові відходи, регіональні аспекти.

1. Введение

В Рио-де-Жанейро на Конференции Организации Объединенных Наций (далее – ООН) по окружающей среде и развитию под названием («Саммит Земли» – 1992 год) был рассмотрен вопрос о достижении тенденции прогресса в сфере экономического роста, но одновременно говорилось о том, что в мире отмечаются вопиющие кризисные вызовы в экологической сфере: глобальное потепление, истощение или деградация природного капитала, высокие уровни загрязнения, накопление разных видов отходов и др.

Сложившаяся ситуация предопределила необходимость ее всестороннего переосмысления и перехода к формированию новой модели развития XXI века и на данном Саммите прозвучал призыв ООН принять парадигму устойчивого развития.

«Что такое устойчивое развитие? Это развитие общества, которое позволяет удовлетворять потребности нынешних поколений, не нанося при этом ущерба возможностям для удовлетворения их собственных потребностей. Оно включает в себя три взаимосвязанных и подпирющих друг друга основы – экономическое развитие, социальное развитие и охрану окружающей среды. Данные три основы не могут быть эффективными, если они рассматриваются как конкурирующие программы» (WHO, 2012).

С тех пор «устойчивое развитие» и «зеленая экономика» являются направляющими принципами многих национальных стратегий развития, реализация которых возможна через программу EaP GREEN (программа «Экологизация экономики в странах Восточного партнерства ЕС», green-economies-eap.org/) и осуществляется на сегодняшний день благодаря поддержке таких международных организаций, как ОЭСР, ЕЭК ООН, ЮНЕП и ЮНИДО, при финансовой поддержке Европейского Союза и других двусторонних доноров. Кроме того, консультационную помощь представляют такие развитые страны, как Австрия, Норвегия, Швейцария и Нидерланды – страны с «низким экологическим следом» (OECD, 2018).

«Опыт зарубежных стран, принявших «экологический след» в качестве важнейшего индикатора устойчивого развития и решивших выстраивать свое дальнейшее развитие на принципах «зеленой экономики» (Швейцария, Китай, Объединенные Арабские Эмираты, Филиппины), свидетельствует о возможности сокращения размеров экологического следа (к примеру, в Швейцарии к 2050 г. планируется сокращение экологического следа страны до глобально устойчивых показателей). Появляются и новые системные средства, способствующие к уменьшению экологического следа – системы энергетического менеджмента (EN 16000 и ISO 50000. Energy Management Systems)» (Sausheva, 2017: 5).

С учетом проблем в сфере образования, учета, переработки отходов, наличия большого объема несанкционированных свалок, приведших к значительному ухудшению состояния окружающей среды, а следовательно, и к снижению уровня жизни населения, в Казахстане первоочередной по важности задачей предвидится переход к циркулярной экономике с использованием ресурсосберегающих и энергоэффективных технологий. И такая ситуация не является разовым случаем, характерным только для Казахстана, к аналогичным выводам пришли и ученые из Украины (Golovchenko, & Nitsenko, 2015).

Практическая модель реализации циркулярной экономики в обобщенном виде выглядит так: «В процессе эволюции и диверсификации промышленная (индустриальная) экономика строго следует своей главной особенности – линейной модели потребления ресурсов по принципу «изъять – произвести – выбросить» («take – make – waste»). При данной модели производства потребитель получает готовый товар,

изготовленный из определенного количества сырья, впоследствии при выполнении своего назначения, утилизируемый. Следует отметить, что количество необоснованно выброшенных и недоиспользованных продуктов увеличивается, вытесняя естественную среду обитания человека» (Gureva, & Butko, 2019: 2368).

Однако, в экономической жизни мировым сообществом поддержана модель круговой (циркулярной) экономики, реализация которой подразумевает недопущение формирования отходов, а также использование улучшенных дизайнерских разработок материалов, изделий и эффективных бизнес-моделей экологического предпринимательства.

2. Обзор литературы

Исследование подходов к определению понятия циркулярной экономики позволило авторам сделать выводы, что система управления отходами является одним из важных элементов циркулярной экономики.

«Эффективное функционирование системы управления отходами в рамках замкнутого цикла полагается на так называемый «принцип трех R» – Reduce, Reuse and Recycle (сокращай потребление или уменьшай образование отходов, используй повторно и перерабатывай) Необходимость внедрения «принципа трех R» впервые была озвучена представителями Японии на саммите большой восьмерки в 2004 г., где данный принцип получил широкую поддержку от мировых лидеров. Конечной целью политики, основанной на «принципе трех R», является модель общества, где все ресурсы (полезные ископаемые, энергия, вода) будут использоваться настолько эффективно, что само понятие «отходы» перестанет существовать. Экономика начинает работать в рамках концепции Zerowaste – «ноль отходов». Системы управления отходами во многих странах уже сейчас отвечают принципам циркулярной экономики» (Vorotnikov, Lyzhin, & Ipatova, 2018).

Схема эволюции от модели 3R до 9R в циркулярной экономике для достижения целей устойчивого развития представлена в работе российских ученых на основе обобщения научных толкований и подходов европейских исследователей (Mochalova, 2021: 17). В основу схемы–иерархии методов управления экономики замкнутого цикла была заложена сигнатура 3R, затем в процессе развития концепции циркулярной экономики происходит расширение до 6R (восстановление или сжигание материалов с получением энергии (Recover), перепроектирования (Redesign), ремануфактуринг (Remanufacture)) и далее с использованием способов умного потребления схема расширилась до 9R (ремонт и обслуживание (Repair), обновление старого (Refurbish), повышение интенсивности использования продукта (Rethink)) (Houshyar, Hoshyar, & Sulaiman, 2014; Gureva, 2019).

«Реализация перехода к циркулярной экономике требует участия многих заинтересованных сторон. Это особенно важно для реализации последовательной стратегии, когда необходимо привлечь широкий круг участников, включая национальные / региональные / местные органы власти, местные предприятия, неправительственные организации, социальные предприятия, потребителей / граждан, академические и исследовательские центры» (Stukalo et al., 2018: 64).

Природа понятия «зеленая экономика» обществом понимается по-разному: многие считают, что это совершенно новые отрасли, другие отдают предпочтение новым технологиям экосистемы, последние придерживаются мнения, что суть данной категории означает переход на новый качественный этап развития экономики.

Если обобщить эти разночтения по сути вышеуказанного понятия, то «зеленая» экономика – «это экономика, направленная на сохранение благополучия общества, за счет

эффективного использования природных ресурсов, а также обеспечивающая возвращение продуктов конечного пользования в производственный цикл, что отвечает сути концепта – циркулярная экономика» (*Khamzina, & Zhumabekova, 2015*).

С понятием циркулярной экономики всплывает имя Эллен МакАртур, которой был создан в 2010 году благотворительный фонд своего имени, работающий в 6 основных направлениях: анализ, связи, системные инициативы, учреждения, правительства, города, бизнес и образование. В настоящее время данная организация признана лидером мировой мысли, включая круговую экономику в повестку дня лиц, принимающих решения в бизнесе, правительстве и научных кругах (*Ellen MacArthur Foundation, n.d.*).

На сегодняшний день весь мир стал перед проблемой необходимости переработки, обезвреживания и утилизации твердых бытовых отходов (в дальнейшем – ТБО) и запоздалое решение данного вопроса может привести к глобальным эпидемиям (например, чума, холера), к серьезному загрязнению населенных пунктов и другим экологическим последствиям.

Теоретические основы формирования циркулярной экономики исследованы отдельными учеными, работающими в данном направлении. Среди них Е. Постников, Д. Валько и М. Кондратов (*Postnikov, Valko, & Kondratov, 2019*) рассматривают вопросы анализа возможных социо-эколого-экономических эффектов, сопровождающих глобальную реализацию концепции циркулярной экономики в долгосрочной перспективе. Так, Н. Пахомова с коллегами (*Pakhomova, Rikhter, & Vetrova, 2017*), В. Ризос с коллегами (*Rizos et al., 2016*) в своих публикациях активировали перспективы внедрения циркулярных бизнес-моделей в практическую деятельность современных предприятий. И. Панин (*Panin, 2018*) обратил внимание на то, что некоторые страны пытаются снизить уровень загрязнения пакетами с помощью законодательного регулирования. А. Видянова (*Vidyanova, 2017*) обозначила проблемы мусоропереработки в Казахстане и заявила о зачаточном состоянии циркулярной экономики в государстве.

Обзор литературных источников показал, что в странах постсоветского пространства еще недостаточны подходы к решению проблем переработки отходов потребления, если рассматривать Казахстан, то особо актуальным является вопрос переработки ТБО. Поэтому научные исследования в области этой проблемы, включающие в себя обобщение опыта деятельности мусороперерабатывающих предприятий из мировой практики, изучение специфики данной отрасли в Казахстане очень актуальны и перечисленные обстоятельства послужили выбором этой темы исследования.

3. Цель исследования

Целью данного исследования является обоснование необходимости переосмысления сути циркулярной экономики самим государством, обществом и каждым гражданином в отдельности. Изучение концепции управления отходами в контексте перехода к циркулярной экономике позволит оценить, установить особенности и определить направления апробации зарубежного опыта в сфере управления отходами в Казахстане.

4. Методология и данные

Методология исследования построена на теоретических положениях и подходах к вопросу переработки отходов в контексте циркулярной экономики.

В исследовании были использованы методы системного анализа, при этом произведен обзор научных источников отечественных и зарубежных авторов. Особое внимание было уделено обобщению фактов из зарубежной практики

касательно решения проблем переработки отходов, отбору и систематизации материалов по Казахстану с использованием статистических и других методов исследования проблемы переработки отходов, как одной из важной составляющей.

5. Результаты и обсуждения

В Казахстане по данным Министерства экологии, геологии и природных ресурсов Республики Казахстан, фактические эмиссии загрязняющих веществ в атмосферу по итогам 2019-2020 годов составили в среднем 2,4 млн т, а среднегодовой прирост – более 100 тыс. т; если эту ситуацию оставить без внимания, то к 2030 году прогнозируется, что данная цифра достигнет 3,6 млн т. По итогам 2020 года в Казахстане насчитывается 3 292 объектов размещения ТБО, но всего 601 объект (18,2%) соответствует экологическим и санитарным нормам, при этом ежегодно в Казахстане образуется 4,5-5 млн. т ТБО. Надо отметить, что по итогам 3 квартала 2020 года в Казахстане от общего накопленного объема отходов было переработано лишь 15,8% и данная сфера не является инвестиционно-привлекательной (*Egov.kz, 2020*).

Разработанный новый Экологический кодекс Республики Казахстан в 2019 году считается принципиально новым документом с использованием опыта ОЭСР по регулированию экологических отношений и принципы, заложенные в этом кодексе, созвучны с принципами циркулярной экономики в странах ОЭСР (*Mirzagaliev, 2019*).

Ключом решения экологических проблем в современности определен переход от линейной модели производства к циркулярной экономике (экономике замкнутого цикла), которая фокусируется на ответственном потреблении и производстве через обеспечение эффективности жизненного цикла товаров и услуг, что означает развитие технологий переработки и восстановления (пластика, макулатуры и других материалов), при этом упор делается на сервисы совместного потребления (*sharing economy*), внедрение круговых цепочек производства (например, сельхозотходы превращаются в биотопливо) и т.д. (*Postnikov, Valko, & Kondratov, 2019; Osipov, 2019*).

На данном этапе очевидны экологические вызовы, которые в масштабной повестке формируют конкуренцию с политическими, финансовыми и социальными проблемами. В Докладе о глобальных рисках Всемирного экономического форума рассматривается эволюция карты глобальных рисков и их взаимосвязь и в ней отмечаются, что такие риски, «как ухудшение климата, дефицит скоординированных усилий государств в части защиты окружающей среды и недостаток инвестиций в создание инфраструктуры для предотвращения стихийных бедствий, на протяжении последнего десятилетия попадают в ТОП-10 или даже в ТОП-5 главных угроз для человечества на следующие десять лет» (*WEF, 2021*).

Как показывает опыт развитых стран, большое значение для успешности трансформации линейной модели экономики в циркулярную имеют подготовленность общественного сознания, рост озабоченности и активности представителей предпринимательских кругов и населения в результате осознания какой вред для здоровья людей и для природы может нанести применение сложившихся в недрах индустриальной эпохи весьма расточительных линейных моделей производства и потребления (*Pakhomova, Rikhter, & Vetrova, 2017*).

Существенное внимание к проблеме циркулярной экономике и перспективам внедрения бизнес-моделей в практической деятельности предприятий проявляют, и представители научного общества России и это подтверждается большим количеством исследований, научных отчетов, обзоров литературы в зарубежных изданиях. Однако, отмечается то, что российские исследователи анализируют не российский, а в основном зарубежный опыт, такой подход присущ и для Казахстана (*Rizos, et al., 2016*).

Кроме того, в ежегодном докладе о глобальных рисках Global Risk Report, подготовленным Всемирным экономическим форумом, признано, что на мировой арене сегодня существует значительный дефицит финансирования инфраструктуры (financing infrastructure gap) в размере 18 трлн дол. США, и чтобы инфраструктура была устойчивой к воздействию негативных экологических последствий в перспективе финансирование инфраструктуры должно увеличиться и составить 79 трлн дол. США до 2040 года (Lebourgeois, 2021).

По представленной информации в табл. 1, можно заметить, что размеры образования отходов напрямую зависят от уровня благосостояния, т.е. страны с самым высоким показателем ВВП на душу населения, которые составляют 16% от общего количества населения планеты, производят 34% всех отходов, но они также большое внимание уделяют развитию инфраструктуры системы управления отходами. Упомянутые государства (Швейцария, Исландия, Норвегия, Дания, Швеция, Германия, Австрия) характеризуются высоким уровнем ВВП на душу населения, активно поддерживают реализацию национальных приоритетов по вопросу развития «зеленой экономики», включая систему управления переработки отходов и в этих странах всего 2% отходов в среднем размещаются на полигонах и наносят вред окружающей среде (WEF, 2020; WEF, 2021).

Таблица 1: ТОП-10 стран с «зеленой» экономикой

№	Страна	Индекс развитости «зеленой экономики», 2018	Показатель ВВП на душу населения (дол. США по ППС), 2020
1	Швеция	76,08	51925,7
2	Швейцария	75,94	86601,6
3	Исландия	71,29	59260,9
4	Норвегия	70,31	67294,5
5	Финляндия	69,97	49041,3
6	Германия	68,9	45723,6
7	Дания	68	60908,8
8	Тайвань	66,69	55724,2
9	Австрия	64,79	48105,4
10	Франция	64,05	38625,1

Источник: составлена авторами по материалам GGEI (2018) и WBC (2021).

Лидером по переработке мусора является Швеция, которая к 2019 году создала достойную инфраструктуру, способную покрыть национальные потребности в утилизации и наладить импорт чужих отходов, для этого местные предприятия принимают около 1,5 млн т «сырья» из-за рубежа, в основном из Норвегии, Ирландии и Великобритании. Скандинавская страна справляется со 100% отходов (это более 4 млн т в год), из которых более 50% занимает переработка, 49% отправляется на мусоросжигательные заводы для производства биоэнергии, менее 1% размещается на полигоны (REN 21, 2019).

Для Швеции актуальны постулаты ответственного потребления, которые донесены до населения: поэтому, к 2025 году в стране планируется снизить вред для окружающей среды от текстильной промышленности на 60%, данного вида отходов на одного жителя должно быть не более 3 кг. С целью реализации экологической стратегии у государства имеется ряд других подобных фактов, к примеру, с 1985 года объем промышленных отходов вырос втрое, но местные предприятия сократили выбросы в атмосферу тяжелых металлов на 99%.

По статистике Greenpeace из 80 млрд выпущенных предметов одежды в мире перерабатывается только 20 млрд текстильных изделий, а 60 млрд направляются на полигоны или мусоросжигательные заводы. Только в Гонконге жители в одну минуту могут избавляться в среднем от 1,4 тыс. футболок (Chung, 2016).

В Швеции и Финляндии в 2020-2021 годах планируется открытие заводов по переработке текстиля, где предусмотрена

автоматическая сортировка разных видов тканей с использованием оптических сенсоров, далее переработка текстиля в зависимости от типов тканей и из полученного вторсырья планируют пошив рабочей одежды, производство набивки и изоляционных материалов (Rusakova, 2018).

По оценке Всемирного банка ежедневно производится более чем 2 млрд т мирового мусора, из которого в среднем 13,5% проходит переработку, 5,5% используется в качестве сырья для биотоплива и биоудобрений, около 40-50% (а в развивающихся странах – более 90%) не находят утилизации по сей день или сжигается. Ежегодно в воды Мирового океана попадает около 13 млн т пластиковых отходов – пакетов, бутылок, упаковок, контейнеров и глобальную водную экосистему в основном загрязняет пластик, который составляет 90% мусора (WBC, 2018).

Существенные проблемы связаны с переработкой пластиковых пакетов, мировое потребление которых в минуту составляет более 1 млн штук. На активную фазу жизненного цикла пакета приходится в среднем 12 минут, а период разложения полиэтиленовых пакетов занимает почти 400 лет, поэтому надо предполагать, что на сегодня нет ни одного пакета, который бы разложился в естественной среде. По данным проекта Conserving Now процесс вторичной переработки проходит всего лишь 1 пакет из 200 (Greenpeace, 2019)

По данным ООН сегодня на каждого жителя планеты ежедневно приходится в среднем 740 г мусора, но в страновом диапазоне этот показатель варьируется от незначительных 110 г до внушительных 4,5 кг. Самыми «мусоращими» территориями признаны Восточная Азия и Азиатско-Тихоокеанский регион и их доля в мировом объеме составляет 23%, а на долю стран Ближнего Востока и Северной Африки приходится всего лишь 6% (White, 2021).

Специализированные международные инициативы и платформы ООН, ОЭСР, Всемирного банка и другие экологоориентированные организации активно поддерживают развитие «инклюзивной зелёной экономики» Казахстана.

Утилизация мусора проблемный вопрос для Казахстана, поскольку только регенерируемые исторические отходы на сумму около 14 млрд дол. США в год подвергаются захоронению на полигонах, кроме того, фактически действующие полигоны не соответствуют санитарно-экологическим нормам и в основном отсутствует разрешительная документация по свалкам.

На начало 2021 года в Казахстане функционирует четыре завода, более 170 предприятий малого и среднего бизнеса, и остро ставится вопрос сортировки отходов – отдельно пищевые по причине неперерабатываемости и вторсырье (пластик, бумага, стекло и др.). Но предлагаемая схема, когда домохозяйки выходят из дома с двумя пакетами, затем мусоровывозящая компания вывозит вторсырье отдельно от пищевых отходов на сортировочное или перерабатывающее предприятие, а неперерабатываемую часть – на полигон для захоронения, пока на большей части Казахстана не работает. Назрело время, когда необходимо изменить отношение к инновационным инициативам, к проблеме циркулярной экономики.

Государству надо обратить внимание на увеличение тарифов, уменьшение кредитной ставки примерно до трех процентов, как во всем мире, и поддержке субсидиями, а управление ТБО на местах требует сосредоточения «в одних руках». Показательные примеры в данной сфере в Казахстане существует, например, брикетирование отходов, что способствует уменьшению объемов мусора в 10 раз и увеличению жизнедеятельности полигона на много лет.

Международные аналитики констатируют, что управление отходами в идеале считается тогда, когда из 100 процентов денег на ТБО мусоровывозящей компании принадлежит 40%, сортировочно-перерабатывающему заводу – 45%, и только 15%

– полигону» (UN, 2019). Но в Казахстане тарифообразование происходит несколько по-другому: 65% от тарифа отводится мусоровывозящей организации, примерно 17% – мусороперерабатывающему заводу, 18% – полигону и такая сложившаяся структура связана с тем, что полигоны принадлежат государству, а в капитале мусоровывозящих организаций также есть доля государства (Zakon.kz, 2019). При этом государство гарантирует стабильность контрактов до 30 лет и при наступлении форс-мажорных обстоятельств на контракт не будет влиять секвестирование бюджета, хотя данная гарантия ни в одном нормативном документе не прописана.

Анализ охвата населения услугами по сбору и вывозу ТБО в Казахстане по данным табл. 2 показывает неравномерность охвата – от 100% в г. Алматы и 96% в Атырауской обл. до 44,5% в Акмолинской обл. Совсем другая ситуация по переработке ТБО и согласно информации, представленной в табл. 2, можно констатировать, что в региональном разрезе ситуация критичная, только для 4-х регионов показатель превышает 10%, для остальных варьируется от 0,23% до 8,13%.

Таблица 2: Охват населения услугами по сбору и вывозу и переработка ТБО по регионам в Казахстане, 2020 год

Регионы	Доля вывоза мусора, %	Доля переработки мусора, %
г. Алматы	100	44,33
Атырауская обл.	96	24,77
Мангистауская обл.	86,7	13,96
Павлодарская обл.	81,4	10,01
Жамбылская обл.	79,1	8,13
Карагандинская обл.	75	6,49
Актюбинская обл.	75	4,47
Восточно-Казахстанская обл.	68,1	3,59
Алматинская обл.	67	3,51
Кызылординская обл.	61,9	3,48
Западно-Казахстанская обл.	60,8	3,17
Южно-Казахстанская обл.	50	2,17
Северо-Казахстанская обл.	45,3	2,11
Костанайская обл.	45	0,93
Акмолинская обл.	44,5	0,23
г. Нур-Султан	56,5	2,59

Источник: Ассоциация по управлению отходами «KazWaste» <http://kaz-waste.kz/>

В практике 1970-1990 годов стеклянные бутылки принимались специальными приемными пунктами, бумага сдавалась в пункты сбора макулатуры, органические отходы отвозились на свиноферму, но настало время пластиковых бутылок и состав ТБО стал более агрессивным: появилось много токсичных, производственных отходов. Настало время комплексного решения данного вопроса с участием правительства, местных властей, общественности и отчасти то, что в эту сферу начал вовлекаться и бизнес-сектор, который заинтересован превратить отходы в экономический ресурс, а их переработка может создать десятки тысяч рабочих мест.

Из мирового опыта можно сказать, что процесс прививания культуры к селективному сбору мусора может быть продолжительным (20-30 лет); на мусороперерабатывающем заводе нужно установить хорошую сортировочную линию, а для утилизации мусора на полигоне потребуются качественные прессы. Россия в 2009 году запустила проект по сортировке отходов и потеряла 70 млн бюджетных денег, такие проекты зачастую бывают провальными по причине неподготовленности менталитета населения СНГ. Отечественные эксперты заявляют, что в Казахстане можно сортировать 30-40% мусора, но это, к сожалению, утопия, так как «созревание» менталитета граждан прогрессивной

Германии к разделному сбору мусора начиналось с 1930-х годов и фактически на сегодняшний день 64% всех мусорных отходов в этой стране перерабатывается или утилизируется, и этот долгий путь прошли и другие продвинутые страны в этом вопросе (Vidyanova, 2017).

6. Выводы

В современных условиях переработка ТБО является не модным трендом, а необходимостью «оздоровления» страны. Основываясь на материалах, посвященных проблематике переработки отходов (Zhandybaev, 2018), можно утверждать:

- в Казахстане недостаточно уделяется внимания вопросу разделного сбора ТБО, в результате чего большая часть потенциала вторичного сырья теряет свою пригодность к дальнейшей переработке, и отсутствие разделного сбора всегда приводит к наибольшей загрязненности и образованию отходов низкого качества;

- по всей Центральной Азии только в г. Нур-Султане задействован один мусоросортировочный завод, который занимается сортировкой отходов и переработкой пластика и бумаги. На данном заводе используется оборудование испанского, итальянского, австрийского и финского производств, и реализуется проект стоимостью 43 млн дол. США, мощность переработки рассчитана на 250 тыс. т ТБО отходов в год. Но эксперты считают, что мощности завода задействованы всего лишь на 30 %, и если работа данного завода не будет поддержана государством, то его жизнедеятельность может быть прекращена;

- по стране регулярно проводятся различные экологические мероприятия (к примеру, в рамках всемирного известного международного соревнования по триатлону «IRONMAN 70.3 Astana», где приняли участие более 1200 атлетов-профессионалов из 40 стран мира, было собрано 100 кг пластика в специально выставленных контейнерах республиканским штабом молодежных трудовых отрядов «Жасел»); а также научные форумы совместно с местными представительными органами, общественностью и другими заинтересованными сторонами, повесткой дня которых является поиски решений по оздоровлению окружающей среды.

На наш взгляд, отмечается следующее:

- на сегодняшний день в Казахстане работают приемные пункты вторичного сырья, но система разделного сбора коммунальных отходов практически отсутствует;

- не отработаны моральный и экономический стимулы у населения для ведения разделного сбора коммунальных отходов и не актуализировано экологическое сознание;

- совершенно не развита система рынка вторичного сырья;

- не ведется государственный статистический учет объемов переработки и утилизации вторичных материальных ресурсов, т.е. не реализуется эффективная система учета и отчетности о деятельности по обращению с ТБО;

- возможно необходимо поднимать вопрос о диверсификации тарифа, сейчас жители платят 0,79 дол. США за вывоз мусора и необходимо решение вопроса местными представительными органами о дополнительных платежах за переработку, захоронение и тогда наступит понимание на какие цели предназначены сборы.

В целом, в Казахстане полигоны, мусоросортировочные, мусороперерабатывающие заводы, цеха должны быть во владении государства, чтобы была сформирована единая политика в этой сфере. Все начинания по данной проблеме находятся в зачаточном состоянии, хотя в мировой практике активное развитие получают мусоросжигающие комплексы, такие технологии позволяют получить до 50 кВт в час

альтернативной электроэнергии и они работают в Гонконге, Испании, Франции, Америке, Швейцарии, однако, эти проекты дорогостоящие в среднем на один проект затрачивается 75 млн дол. США, но в Казахстане наблюдаются проблемы с финансированием «зеленых» проектов и данная сфера для отечественных инвесторов непривлекательна, не окупается сразу же и не обеспечивает извлечение прибыли, и кроме того есть еще ряд других тормозящих факторов.

Обобщая все вышесказанное, отметим, что без руководства определёнными принципами и механизмами, без соответствующей нормативно-законодательной базы невозможно достичь определенных успехов в области рационального управления отходами в контексте реализации циркулярной экономики. Основная проблема – это отсутствие единых научно-обоснованных подходов к системе экономики процесса обращения с твердыми бытовыми отходами, а также отраслевой экономики в данной области.

7. Финансирование



то исследование не получило конкретной финансовой поддержки.

8. Конкурирующие интересы



авторы заявляют, что у них нет конкурирующих интересов.

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UDC classification: 336.71:368.03+330.4

JEL Classification: C52, G21, G22

Model Assessment of Interaction between Banking and Insurance Segments of the Financial Market

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Purpose: To develop a model of interaction between banks and insurance companies, allowing for a joint model assessment from the point of view of the possibility of sustainable operation and development.

Findings: The article develops the theory of dynamic systems and a numerical method for solving the problem of assessing the results of interaction between banks and insurance companies based on a system of differential equations. The additive and multiplicative types of interaction are considered. The results of interaction are analyzed for various variants of the influence of the activities of the studied subjects.

Practical Implications: The proposed approach is applicable to assess the effectiveness of the used model of interaction between banks and insurance companies.

Originality/Value: The author's model of interaction between banks and insurance companies is original. The model has no analogues in the scientific literature of the studied subject area.

Research Limitations/Future Research: The study proposes a generalized dynamic model of interaction without specifying the content of variables and the procedure for determining the input parameters. Its description and application determine potential areas for further research.

Paper type: Theoretical

Keywords: financial services sector, bank, insurance company, bankinsurance, additive and multiplicative interaction.

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Модельна оцінка взаємодії банківського і страхового сегментів фінансового ринку

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Мета роботи: Розробити модель взаємодії між банками та страховими компаніями, що дозволяє проводити спільну оцінку з точки зору можливості стійкого функціонування та розвитку.

Результати дослідження: У статті розвинено теорію динамічних систем та на основі системи диференціальних рівнянь розроблено методіку вирішення проблеми оцінки результатів взаємодії банків та страхових компаній. Розглянуто аддитивний та мультиплікативний типи взаємодії. Результати взаємодії аналізуються при різних варіантах впливу діяльності досліджуваних об'єктів.

Практичне значення дослідження: Запропонований підхід може бути використаний для оцінки ефективності використаної моделі взаємодії між банками та страховими компаніями.

Оригінальність/Цінність дослідження: Авторська модель взаємодії банків та страхових компаній оригінальна. Модель не має аналогів у науковій літературі досліджуваної предметної області.

Обмеження досліджень/Перспективи подальших досліджень: Дослідження пропонує узагальнену динамічну модель взаємодії без зазначення змісту змінних та процедури визначення вхідних параметрів. Його опис та застосування визначають потенційні напрямки подальших досліджень.

Тип статті: Теоретичний

Ключові слова: сектор фінансових послуг, банк, страхова компанія, банкострахування, адитивна та мультиплікативна взаємодія.

Модельная оценка взаимодействия банковского и страхового сегментов финансового рынка

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Цель работы: Разработать модель взаимодействия между банками и страховыми компаниями, позволяющую проводить совместную оценку с точки зрения возможности устойчивого функционирования и развития.

Результаты исследования: В статье развивается теория динамических систем и на основе системы дифференциальных уравнений разработана методика решения проблемы оценки результатов взаимодействия банков и страховых компаний. Рассмотрены аддитивный и мультипликативный типы взаимодействия. Результаты взаимодействия анализируются при различных вариантах влияния деятельности исследуемых субъектов.

Практическое значение исследования: Предложенный подход может быть использован для оценки эффективности используемой модели взаимодействия между банками и страховыми компаниями.

Оригинальность/Ценность: Авторская модель взаимодействия банков и страховых компаний оригинальна. Модель не имеет аналогов в научной литературе исследуемой предметной области.

Ограничения исследований/Перспективы дальнейших исследований: Исследование предлагает обобщенную динамическую модель взаимодействия без указания содержания переменных и процедуры определения входных параметров. Его описание и применение определяют потенциальные направления дальнейших исследований.

Тип статьи: Теоретический

Ключевые слова: сектор финансовых услуг, банк, страховая компания, банкострахование, аддитивное и мультипликативное взаимодействие.

1. Introduction

The constant development of the world economy and financial markets, as well as increasing competition in all areas of trade makes new demands on the activities of monetary institutions. Banks are an integral part of the modern monetary economy; their activities are strongly linked to the needs of reproduction. They will always be at the center of economic life, serving the interests of producers, linking a cash flow to the industry and world trade, agriculture and population. All over the world, banks have both significant power and influence, they have a huge amount of money that comes from businesses, firms, the state, individuals and etc. In fact, banking institutions are the heart of the economic mechanism of each country (Melnychuk, 2015).

As long ago as in the 1990s, a number of trends and development directions emerged on the financial services market, which significantly affected the quality of services and specific financial institutions. In particular, they included the dominance of the banking sector over all others on the financial market (Barras, 1990).

The non-banking financial sector is still far behind the banking sector in terms of both total assets and growth rates. The leading position in the non-banking financial sector is occupied by the insurance market. Both the banking and insurance markets in Ukraine are becoming increasingly competitive, so it is extremely important to position new services. In addition, domestic entities have more confidence in the banking market and are more likely to buy an insurance product from a bank. The combination of banking and insurance services is also one of the ways to maintain relationships with customers, as the availability of a wider range of products can deter the customer from moving to another organization that provides financial services (Makarenko, & Pokotylo, 2014).

The purpose of this research is to study the forms of interaction between banks and insurance companies, as well as to develop a methodology for evaluating the results of such interaction. After a short introduction, the study will focus on creating and testing a model of interaction between banks and insurance companies, which allows you to assess the possibility of joint operation and development.

2. Theoretical background

The article (Makarenko, & Pokotylo, 2014) considers a wide range of theoretical aspects of the interaction of banks and insurance companies. The analysis of forms of the interaction between banks and insurance companies is carried out, the risks arising from such interaction are defined, changes in the relations between bank and insurance companies at various forms of interaction are considered. A set of criteria for determining the feasibility of cooperation has been identified. The sources of information on the basis of which the financial condition of the insurance company is checked for decision-making on further interaction with the insurance company and what stages the insurance company goes through during the inspection by the bank are given.

The study (Agres, & Tymkiv, 2019) is devoted to the substantiation of the concept of «bank insurance» as a process of the interaction between banks and insurance companies. The results of this cooperation are illustrated as the sale of insurance policies together with the products offered by banks. An important factor in the formation of banking and insurance cooperation is new distribution channels of insurance companies.

A generalization of the advantages and disadvantages of the interaction between banks and insurance companies is devoted to the study (Dichevska, Karadjova, & Jolevski, 2018), which emphasizes that the problem of banking insurance is a different philosophy of sales of banking and insurance products.

The article (Prikazyuk, & Oliynik, 2017) reveals the impact of the interaction between insurance companies and banks on the insurance system. The description of the main models of bank insurance in the context of their impact on the insurance system is given and their main advantages and risks are identified.

At the same time, there is some ambiguity in the interpretation of certain issues, and in most of the available studies, the assessment of the effectiveness of the interaction between banks and insurance companies, carried out from the operational, marketing and financial aspects and presented in the form of charts and tables, is empirical.

Finding the most preferred alliance structure between banks and insurance companies is a multi-criteria task (MCDM), to solve which individual authors (Korhonen, & Voutilainen, 2006) have used expert methods and analytical hierarchy processes (AHP).

Only in some cases (Vygovska, Polchanov, & Vygovskiy, 2018) studies of the cooperation of insurance companies and banking institutions or individual segments of the financial market (Prymostka et al., 2020) are based on the mathematical modeling of the dependence of the insurance market on banking in the form of correlation regression models, which provides sufficient arrays of statistics for each individual case.

Thus, it is important not only to systematically study the mechanisms of the cooperation between banks and insurance companies, which is very promising and important for banks, or to assess the feasibility of their interaction and customer satisfaction, but also to involve modern economic and mathematical modeling tools to solve this scientific and practical problem, which is able to reflect the processes of emergence and development of the synergetic effect as a result of combining these entities for a common goal: to make a profit and meet customer needs.

3. Problem statement

The purpose of the study is to assess the effectiveness of the interaction between banks and insurance companies in the financial services market. To achieve this goal, it is necessary to solve the following tasks: to standardize the forms of the interaction between banks and insurance companies in the modern financial services market; to build formalized in the form of economic and mathematical models of representation of the processes of the interaction between banks and insurance companies; to conduct a model assessment of the effectiveness of various forms of the interaction between banks and insurance companies in terms of their sustainable development. We suggest that the most effective form of the interaction between the banking and insurance sectors in the financial market is banking insurance, which, due to multiplicative links between entities, is able to create conditions for their sustainable operation.

4. Methodology

Speaking of achieving a synergy effect as a result of merging banks and insurance companies to achieve a common goal: to make a profit and meet customer needs, it should be noted that the development of synergy as an interdisciplinary field of research has led to changes in understanding the system and its structure.

In particular, the synergetic system is primarily dynamic, the understanding of which is a consequence of a certain idealization, which despises the influence of random perturbations, inevitably present in any real system (Maksishko, & Glazova, 2016).

The article (Malinetskiy, 2005) establishes an isomorphic relationship between the concept of a «dynamic system» and «autonomous system of ordinary differential equations».

The main mathematical apparatus in this case is a qualitative theory of differential equations, and the model is presented by a system of autonomous differential equations in the formula (1):

$$\dot{x}_i = F_i(x_1, x_2 \dots x_n), (i = \overline{1, n}), \quad (1)$$

where x_i is some quantitative characteristics of the socio-economic agent involved in the process.

The main difference between qualitative methods in mathematics is that they are not aimed at obtaining a numerical result, but to identify the characteristics of the phenomenon as a whole, to predict the development of a phenomenon or process. In this case, sometimes it is enough to establish areas of stability and their interpretation (Milovanov, 2001).

The foundations of the qualitative theory of the study of systems of ordinary differential equations of the type were laid by A. Poincare at the turn of the XIX-XX centuries, and the theory itself has developed to such an extent that it is a generally accepted apparatus of nonlinear dynamics, in particular self-organizing systems.

The authors of the article (Mangan, Kutz, Brunton, & Proctor, 2017) emphasize that the theory of dynamical systems allows obtaining basic characteristics and understanding physical, technical, biological and socio-economic processes. Their unified models are created taking into account a specific subject area and allow studying chaotic, oscillatory or bifurcation modes.

Thus, in the article (Gabrin, Meshkova, & Rummyantsev, 2015) the interaction of socio-economic and ecological systems is modeled, and in the articles (Ivanov, 2015; Ivanov, & Ivanova, 2018), two-factor models of household income behavior are built and studied.

The article (Mangan, Brunton, Proctor, & Kutz, 2016) is devoted to the study of nonlinear dynamics within biological systems, using the system of equations as a model of processes (1).

The classical model of nonlinear dynamics is the system of Volterra-Lotka equations allowed the author (Kolyada, Kmytiuk, & Shatarska, 2020) to obtain analytical formulas for estimating the quantitative measure of the risk of decision-maker behavior.

In the study (Vitlinskiy, Kolyada, & Kharlamov, 2012) an analytical, qualitative and quantitative study of the three-factor model of the bank, built in the form of a system of ordinary nonlinear differential equations, which allowed investigating the dynamics of different indicators of efficiency of loan and deposit portfolios, was carried out.

Therefore, taking into account formula (1), we assume that x_1 is a quantitative characteristic of the bank (banking system); x_2 is quantitative characteristics of the insurance company (insurance system).

Then, in terms of the interaction between banks and insurance companies, in which the insurance company provides services to the banking institution, and the banking institution provides services to insurance companies, a generalized two-factor model of the interaction can be represented as:

$$\begin{cases} \frac{dx_1}{dt} = f_1(x_1; x_2), \\ \frac{dx_2}{dt} = f_2(x_1; x_2). \end{cases} \quad (2)$$

The choice of the formula of the functions $f_1(x_1; x_2)$ and $f_2(x_1; x_2)$ and the dynamics of model (2) directly depend on the initial conditions, the nature of interaction and mutual influence of banks and insurance companies.

5. Results and Discussion

The article (Makarenko, & Pokotylo, 2014) shows that insurance companies and banks interact in several areas. Forms of the interaction differ in the level of integration, as well as in the volume of operations.

Thus, possible insurance by the bank's insurance company provides two main forms – retail and comprehensive insurance. Banking services for the insurance company include the ability to service the accounts of the insurance company or keep the technical reserves of the insurer. Under such conditions, the interaction between the insurance company and the bank should help to improve performance.

We propose to call this form of the interaction, which does not involve strong integration and, accordingly, specific legal design, additive. The economic and mathematical model (2) of such interaction can be represented as a system:

$$\begin{cases} \frac{dx_1}{dt} = ax_1 + bx_2, \\ \frac{dx_2}{dt} = cx_1 + dx_2, \end{cases} \quad (3)$$

where a is the coefficient of proportionality, which characterizes the growth rate of the quantitative characteristics of the bank due to its own activities; b is the coefficient of proportionality, which characterizes the growth rate of the quantitative characteristics of the bank due to the interaction with the insurance company; d is the coefficient of proportionality, which characterizes the growth rate of the quantitative characteristics of the insurance company due to its own activities; c is the coefficient of proportionality, which characterizes the growth rate of the quantitative characteristics of the insurance company through the interaction with the banking institution. In connection with their meanings, the parameters a, d are called endogenous, and b, c are called exogenous.

Applying to system (3) of a qualitative theory of ordinary differential equations (Schaeffer, & Cain, 2016), we can determine that a single steady state is determined from the condition

$$\begin{cases} \frac{dx_1}{dt} = ax_1 + bx_2 = 0; \\ \frac{dx_2}{dt} = cx_1 + dx_2 = 0 \end{cases} \quad (4)$$

and corresponds to the phase space point $x_1 = x_2 = 0$. The nature of a particular point depends on the ratio of parameters a, b, c, d .

If we consider a situation in which banks and insurance companies receive a positive result both through their own activities and as a result of the interaction according to the constructed model (5), then $a; b; c; d > 0$. A special point $x_1 = x_2 = 0$ is unstable (Unstable Node) in this case, which is expressed in the unlimited growth of quantitative indicators of banks and insurance companies (Fig. 1, t here and hereafter denotes the time measured in months).

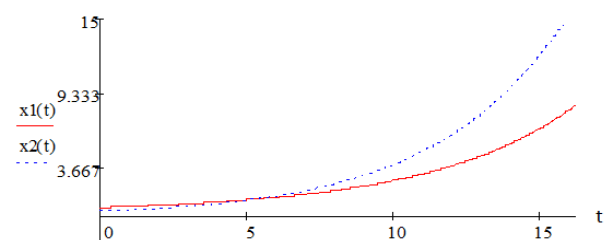


Figure 1: Dynamics of quantitative indicators of banks and insurance companies according to the model of interaction (3) at $a=0,1; b=0,05; d=0,2; c=0,05$ and initial conditions: $x_1(0)=0,6; x_2(0)=0,3$

Source: developed by the authors.

It is known that the interaction of banks and insurance companies, in addition to advantages, also has disadvantages, which, among other things, may arise due to the risk of occurrence and transfer of risks from the banking sector to the insurance sector and vice versa (Dichevska, Karadjova, & Jolevski, 2018).

In this case, in the model of additive interaction (3), the exogenous coefficients b, c acquire negative values.

Let the rate of growth of the quantitative characteristics of the insurance company due to the interaction with the banking institution decrease as a result of the additive interaction ($c < 0$). In this case, the special point at up to a certain limit of the value of the parameter $c < 0$ retains its character, Unstable Node then moves to the type Unstable Focus, for which in the short or medium term the values of indicators x_1 and x_2 , after a certain increase, decrease rapidly in a negative direction (Fig. 2).

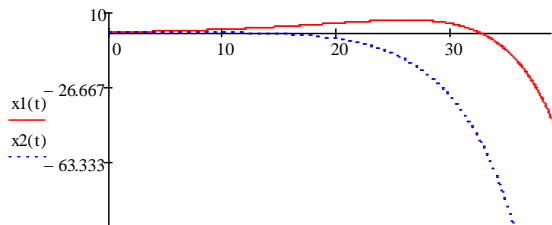


Figure 2: Dynamics of quantitative indicators of banks and insurance companies according to model of interaction (3) at $a=0,1; b=0,05; d=0,2; c=-0,06$ and initial conditions: $x_1(0)=0.6; x_2(0)=0.3$

Source: developed by the authors.

The only variant of the nature of the studied special point, which has a neutral stability is Linearization Fails, for which the variables x_1, x_2 are characterized by oscillatory dynamics (Fig. 3).

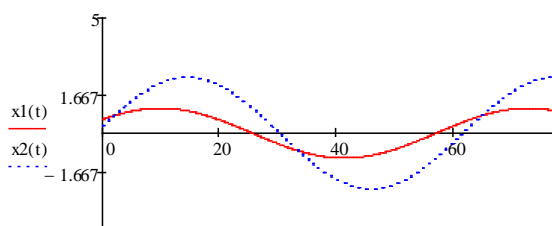


Figure 3: Dynamics of quantitative indicators of banks and insurance companies according to model of interaction (3) at $a=0,2; b=-0,1; d=-0,2; c=0,5$ and initial conditions: $x_1(0)=0.6; x_2(0)=0.3$

Source: developed by the authors.

The proposed example corresponds to the situation of negative development of the insurance market and its negative impact on the banking sector ($b; d < 0$). At the same time, maintaining a stable fluctuating nature of the process involves significant assistance from banks, which in such a situation and the proposed additive model of the interaction should be considered impossible.

The stability of the state $x_1 = x_2 = 0$ is an undesirable result, and the conditions for its occurrence correspond to the opposite in magnitude and different in absolute value indicators of the efficiency of banks and insurance companies (a and d , respectively), which is typical of the financial market with a significant negative imbalance in the performance of individual segments or asynchronous fluctuations of these indicators (Adarov, 2019), which leads to an imbalance. This situation is accompanied by the corresponding, commensurate in magnitude with the endogenous parameters, exogenous indicators. Fig. 4 shows the dynamics corresponding to a particular point of the Stable Focus type.

Nowadays, the interaction of banks and insurance companies is gathering pace, moving from a simple mutual service of their institutions to comprehensive intersectoral and intermarket interaction, due to the factors that are mutually beneficial from the partnership (Dichevska, Karadjova, & Jolevski, 2018) and aimed at achieving mutual stability and reliability.

We are talking about Bancassurance – a set of financial services that can meet both banking and insurance needs of a client at the same time.

Bancassurance is used to describe the partnership between a bank and an insurance company through which an insurance company uses a bank sales channel to sell insurance products (Dichevska, & Karadjova, 2016).

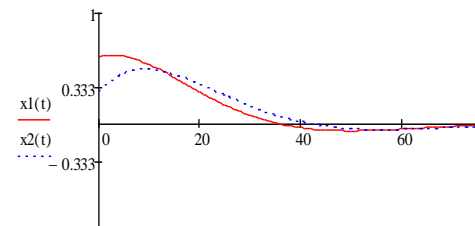


Figure 4: Dynamics of quantitative indicators of banks and insurance companies according to model of interaction (3) at $a=0,1; b=-0,15; d=-0,2; c=0,18$ and initial conditions: $x_1(0)=0.6; x_2(0)=0.3$

Source: developed by the authors.

Different types of Bancassurance models are classified according to the specifics of interaction and dependence of participants:

- integrated models (Bancassurance activities are closely related to the main activities of the bank);
- models based on consultations, which are characterized by less integration, and sales of which are carried out with the help of professional insurance consultants (non-integrated models);
- models of open architecture.

Thus, non-integrated models of bank insurance are often characterized by countries with underdeveloped financial markets (Devi, 2019), for whom such a distribution channel is relatively new.

This form of interaction is called additive-multiplicative, and its mathematical model is represented as a system

$$\begin{cases} \frac{dx_1}{dt} = ax_1 + bx_1x_2; \\ \frac{dx_2}{dt} = cx_1x_2 + dx_2. \end{cases} \quad (5)$$

System (5) is nonlinear, and its qualitative analysis (Hirsch, & Smale, 1974) shows the presence of two singular points: $x_1 = x_2 = 0$; $x_1 = -\frac{d}{c}; x_2 = -\frac{a}{b}$.

The characteristic equation for $x_1 = x_2 = 0$ has the formula $(a-\lambda)(d-\lambda) = 0$, and its roots are $\lambda_1 = a; \lambda_2 = b$ indicating that the studied state is stable with the negative values of endogenous parameters even in cases when the results of the introduction of bank insurance bring tangible results at least for one of the parties (Fig. 5). Obviously, they have only a short-term positive impact on the development of the process.

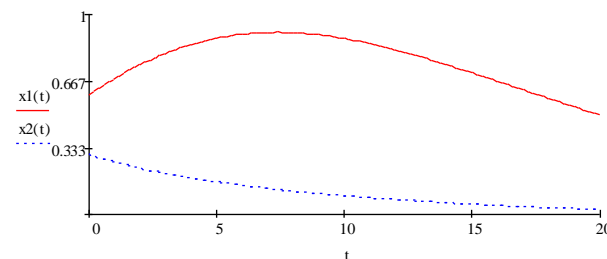


Figure 5: Dynamics of quantitative indicators of banks and insurance companies according to model of interaction (5) at $a=-0,1; b=0,8; d=-0,2; c=0,1$ and initial conditions: $x_1(0)=0.6; x_2(0)=0.3$

Source: developed by the authors.

The characteristic equation for the singular point $x_1 = -\frac{d}{c}$; $x_2 = -\frac{a}{b}$ has the formula $\lambda^2 = ad$, and its conjugate complex roots with different-sign values of endogenous parameters provide the dynamics of the process in its vicinity, typical of Linearization Fails (Fig. 6, Fig.7).

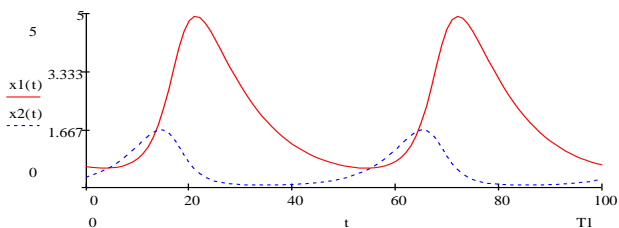


Figure 6: Dynamics of quantitative indicators of banks and insurance companies according to model of interaction (5) at $a=-0,1$; $b=0,2$; $d=0,2$; $c=-0,1$ and initial conditions: $x_1(0)=0,6$; $x_2(0)=0,3$

Source: developed by the authors.

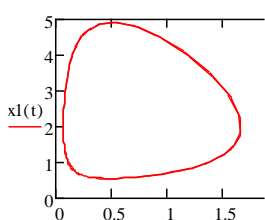


Figure 7: Dynamic system phase plane (5) at $a=-0,1$; $b=0,2$; $d=0,2$; $c=-0,1$ and initial conditions: $x_1(0)=0,6$; $x_2(0)=0,3$

Source: developed by the authors.

It is interesting that under the conditions of the additive-multiplicative interaction described by model (5), shown in Fig. 6, Fig. 7, the dynamics arises as a result of asynchronous fluctuations in the performance of banks and insurance companies, when, to compensate for its own losses, one of the subjects of interaction uses the results of their joint activities in conditions when the other one needs to make some losses for this.

The studied situation is completely identical to the dynamics of the classical interaction model which is known as Predator-Prey Model or Lotka-Volterra system (Kunwar, 2019).

Strengthening the integration processes of the interaction between banks and insurance companies can be displayed in the multiplicative formula of the model

$$\begin{cases} \frac{dx_1}{dt} = ax_1x_2; \\ \frac{dx_2}{dt} = bx_1x_2, \end{cases} \quad (6)$$

in which a is a coefficient that characterizes the impact on the bank of the interaction between it and the insurance company; b is a coefficient that characterizes the impact on the insurance company of the interaction between it and the bank.

Let us assume that the coefficients a ; b can change over time, they are $a = a(t)$; $b = b(t)$. Their formula can be set taking into account the fact that one of the conditions for interaction is internal competition between banks (Fuior, & Zavařki, 2020) and in the segment of insurance services (Mangra, Stanciu, & Mangra, 2019), which is typical of bank insurance models with an open architecture.

Let us make the dimensionless and assume that x_1 is a part of the banking system involved in bank insurance, $x_1 \in [0; 1]$; x_2 is a part of the insurance system involved in bank insurance, $x_2 \in [0; 1]$.

We represent $a = \tilde{a}(1 - x_1)$; $b = \tilde{b}(1 - x_2)$. System (6) is converted to the formula:

$$\begin{cases} \frac{dx_1}{dt} = \tilde{a}x_1(1 - x_1)x_2; \\ \frac{dx_2}{dt} = \tilde{b}x_1x_2(1 - x_2). \end{cases} \quad (7)$$

Note that the factors $\tilde{a}x_1(1 - x_1)$ and $\tilde{b}x_2(1 - x_2)$ in the corresponding equations of model (7) reflect the relationships inherent in Verrhulst models for population dynamics (Brilhante, Gomes, & Pestana, 2019).

Applying to system (7) of elements of the theory of ordinary differential equations (Hirsch, & Smale, 1974), steady states are determined from the condition

$$\begin{cases} \frac{dx_1}{dt} = \tilde{a}x_1(1 - x_1)x_2 = 0; \\ \frac{dx_2}{dt} = \tilde{b}x_1x_2(1 - x_2) = 0. \end{cases} \quad (8)$$

The special points of the phase space are $x_1 = x_2 = 0$ and $x_1 = x_2 = 1$, among which the point $x_1 = x_2 = 0$ is not stable, and the point $x_1 = x_2 = 1$ at positive values of the parameters a, b has a stable character (Fig. 8).

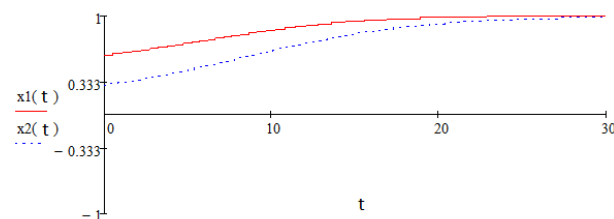


Figure 8: Dynamics of quantitative indicators of banks and insurance companies according to model of interaction (7) at $a=0,3$; $b=0,2$

Source: developed by the authors.

It is clear that increasing the efficiency of the integration of banks and insurance companies in the form of bank insurance to achieve the desired level of ownership of potential markets is accelerated.

To take into account the additional conditions of operation of banks and insurance companies, model (7) should be supplemented accordingly. Thus, when there are the factors causing the fall of the banking sector, model (7) has the formula

$$\begin{cases} \frac{dx_1}{dt} = ax_1x_2(1 - x_1) - cx_1; \\ \frac{dx_2}{dt} = bx_1x_2(1 - x_2), \end{cases} \quad (9)$$

in which c is the coefficient of reduction of the functioning of the banking component.

In this case, maintaining (increasing) the level of integration allows, at a certain level, compensating for this negative impact on the banking sector.

Thus, one of the special points of system (9) will be: $x_1 = \frac{a-c}{a}$, $x_2 = 1$ (Fig. 9).

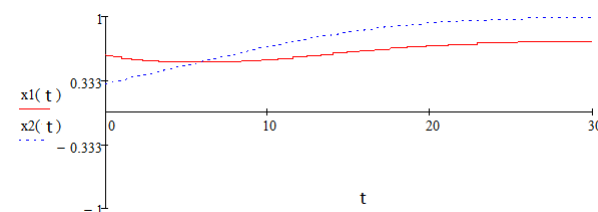


Figure 9: Dynamics of quantitative indicators of banks and insurance companies according to model of interaction (9) at $a=0,4$; $b=0,3$; $c=0,1$

Source: developed by the authors.

Thus, the interaction of banks and insurance companies on the principles of bank insurance allows achieving stable states in the conditions of negative exogenous influence. The factors of these states are based on the existing, in this case, synergistic effect.

6. Conclusions

Between all system elements, their aggregates and separate systems, there is always a direct or indirect interaction, the system-forming character of which should provide their influence, participation in system-wide processes.

The presented work proposes a methodology for assessing the results of the interaction between the banking and insurance segments of the financial market, which is based on the assumption of the existence of a self-organizing nature of this process. The economic-mathematical model is built in the form of a system of differential equations, which is consistent with the theory of dynamical systems.

It is proposed to call the form of the interaction, which does not provide any strong integration and specific legal design, additive. It is shown that this form of the interaction is not effective enough. After all, in the conditions of negative development of one of the studied subjects, the support of the stable (oscillating) nature of the process provides significant assistance from the other subject, which in such a situation and the proposed additive model of the interaction should be considered impossible.

Such a topical organizational form of the partnership between banks and insurance companies as bank insurance, which provides the ability to meet the banking and insurance needs of the client at the same time, has been studied in detail.

Different types of bancassurance models have been analyzed, which are classified according to the specifics of interaction. It is proposed to call non-integrated models additive-multiplicative. The results of the model experiment show that under such conditions of the interaction to compensate for their own losses, one of the subjects uses the results of mixed activities, which leads to stable asynchronous fluctuations of an economic activity. A possible form of interaction in this case could be a joint venture or a strategic alliance.

Strengthening the integration processes of the interaction between banks and insurance companies is reflected in the multiplicative form of an interaction model. It is characterized by high efficiency of joint sustainable development not only in the conditions of market competition, but also in situations when one of the subjects is exposed to external negative influences. This can be explained by the emergence of a synergistic effect.

The article proposes a new direction of research and evaluation of the effectiveness of the interaction between banks and insurance companies in the financial market. The authors plan to conduct the research that clarifies the content of the variables included in the economic and mathematical model and the procedure for determining the input parameters.

7. Funding

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8. Competing interests

The authors declare that they have no competing interests.

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