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ARTICLE

On the Role of Security in the System of Personal Values: Are Conservatives Prioritizing Security?

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ABSTRACT

Security is a value contained in most theories of personal values. Yet, while the relations among the most basic values are clear and reliable, the role of security in the system of values remains ambiguous. People striving for security are often also striving for tradition and conformity but sometimes they are focusing more on other values (such as health values, for example). Based on eight representative surveys (N = 24,000) in several German cities between 1998 and 2022, the author shows that when measuring security without suggesting a particular meaning of this notion, security takes a relatively central position within the system of values and their components (shown by multidimensional scaling, MDS). People striving for security also emphasize the importance of law and order, working hard, and having a good family life as guiding principles in their lives. Conformity is not that important for them, and having an exciting life is even negatively correlated. Age has little impact on the MDS structure of values and their components, even though people exhibit substantial changes in the relative weights they assign to many values as they get older.

Keywords: Personal values; Security; Value circle; Age; Gender; Multidimensional scaling

1. Introduction

Personal values are key variables in macro-management. Personal values are defined as broad beliefs that act as guiding principles in a person's life [1-3]. Research has identified a small set of basic values that hold universally for all persons. Today's most prominent value theory by Schwartz [1], for example, distinguishes ten basic values, i.e., power, achieve-

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ment, hedonism, stimulation, self-direction, universalism, benevolence, tradition, conformity, and security. These values are modeled as points on a circular scale, with four segments called higher-order values (**Figure 1**). It is predicted that the various values are dynamically related to each other. For example, persons who strongly strive for Conservation should automatically care less for Openness to Change. On the other hand, persons striving for security (SE) should also value tradition (TR) and conformity (CO).

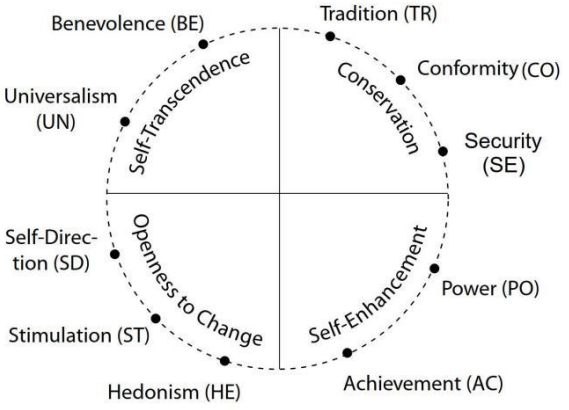

Figure 1. Idealized circle structure of ten basic values and four higher-order values.

Numerous studies have supported the value circle [1,4,5]. Security, however, has been found to play unclear or different roles in the system of personal values. Various authors [1,6,7] have shown that SE lies in the neighborhood of TR/CO and PO/AC if the values are assessed using the instrument that is typical for most value studies, the Portrait Value Questionnaire (PVQ21 [8]). If, however, one uses the Individual Values Reflexive Scale (IVRS [9]) and codes its items in the categories of the Schwartz theory, the value circle is supported again, but SE is now positioned close to self-transcendence values (UN, BE) [7,10-12].

The PVQ21 measures a person's priority for security by asking the respondents to rate how similar they feel to a person described by two items: (1) It is important for her to live in secure surroundings. She avoids anything that might endanger her safety; (2) it is very important to him that his country be safe from threats from within and without. He is concerned that social order be protected [8]. The IRVS, in contrast, constructs an SE index based on an item that asks the respondents to rate "Striving for security" (without addressing particular components of security) and the item "Living health-consciously". Thus, PVQ- and IRVS-based measurements of security are automatically pulled into the direction of conservation values and "green" values, respectively.

Other instruments use other items. Schwartz et al. in their refined value theory [5,13,14], differentiate between societal security and personal security. They then use an extended version of the PVQ, the PVQ-RR, that measures social security with three items focusing on national security, a strong state, and social order and stability. The three items on personal security focus on avoiding things that endanger the respondent's safety, personal security, and secure environments. The refined theory, however, leaves both SE categories in the group of conformity values on the circle. Thus, SE remains theoretically in conflict with values such as self-direction or nature protection. Hanel et al. [15], using the PVQ-RR, report that security lies in between TR and BE, but—in its more social rather than personal components—relatively close to the center of the value circle. This more central location of SE components is also reported by Schwartz et al. [5]. However, these authors locate SE almost opposed to BE, in between TR and PO.

Measuring the psychological importance of security by items that focus on certain components of security always comes with the risk that these components do not match the respondents' notions of security. The Schwartz Value Scale (SVS) [16], for example, assesses security by referring to national security, family security, social order, cleanliness, and reciprocation of favors. Hence, the SVS does not offer the respondent the same value components when asked to rate security as the PVQ21. Cleanliness, for example, is not contained in the PVQ items. This component comes from the Rokeach Value Survey (RVS) [17], where it is considered an instrumental value, i.e., a guiding principle that only serves to reach intrinsic values. They are values that really count and for which one would possibly even go to

extremes. For benevolence or hedonism, for example, even sacrificing oneself seems conceivable but not for security. Thus, security, once more, takes on a special role among basic personal values.

A mismatch between the researchers', the respondents', and the instruments' notions of security can lead to unexpected findings. Biber et al. [6] derive theoretically how persons' value preferences are related to the way people approach other people in social relationships, measured in terms of their preferences for the four models (e.g., authority ranking (AR)) of the Relational Models theory [18]. They find empirically that "all hypothesized relationships were confirmed… except the relationship between tradition/security and ARsub" (p. 621). The reason for this unexpected finding may be a mismatch of the various notions of security.

Security also plays a special role in value dictionaries constructed by lexical methods. In Aavik & Allik's listing [19], safety occurs only in certain subforms such as national security and family security. In Renner's listing [20], safety is completely missing, even though he asked "experts" to select from a comprehensive dictionary "nouns and adjectives that possibly described personal or societal values", while being "over-inclusive in order to compile a list as comprehensive as possible" (p. 129).

Ponizovskiy et al. [21] propose another value dictionary. Beginning with Schwartz's ten basic values, their final dictionary shows 85 entries for the value security (e.g., caution, clean, menace, safety, security, stable, threat, violence). The relative frequency of such notions in texts generated by a person is taken as an indicator of how much this person prioritizes particular values. The authors report that the persons' value scores with seven out of the ten basic values measured by this method correlated significantly with the corresponding value indexes based on the Schwartz Value Survey. For SE, however, the correlation was $r = 0.00$.

Studies focusing on psychological security (e.g., Maslow [22]) typically assume that security is a complex psychological object. Dzhamalova et al. [23], for example, remark in the fear-of-crime context: "… the psychological security of urban residents should be a complex multidimensional structure rather than a simple one-dimensional structure… the psychological security of urban residents can be divided into three categories: psychological, social, and environmental" (p. 2). Fear-of-crime researchers often explicitly address such components but do not collect data on the other basic values. Thus, one cannot assess how the various security components are related to values such as tradition or hedonism.

Belic et al. [24] are more comprehensive in their study. They propose to "treat values as superordinate constructs whose meanings rest on their subordinate constructs idiosyncratic to every person" (p. 1280). To identify the subordinate constructs of each of Schwartz's ten basic values, they choose a qualitative approach, asking a sample of 281 "emerging adults" in Serbia two questions: "Imagine a person who finds [value of interest] important. What does that person do? How does she/he behave?" (p. 1283). For security, they report that "The most prominent subordinate construct of Security reflects the need for maintaining social relations (Social cohesion)" (p. 1288). Moreover, they find considerable overlap of the subordinate constructs of the basic values, which suggests how to explain the observed psychological distances among the values [25].

To better understand how respondents understand security and its role as a guiding principle relative to other values, one could also interview the respondents on how they arrived at their judgments after they completed a survey questionnaire. Yet, such qualitative interviews [26] may simply be "too cognitive" to adequately uncover the reasons for the more or less spontaneous answers to an overall security item in an anonymous survey. In the study below, we aim at understanding the respondents' notion of security by relating the respondents' observed importance scores for "security" to the importance scores of various other personal values and their components. *No particular meaning is suggested when asking the respondents to rate the importance of "security"*. That is, no definition is given for security, and no components or subordinate constructs are suggest-

ed. We thus leave it to the respondents to interpret the notion of security. Such single-item ratings have been shown to be remarkably reliable and valid, and they may even explain more variance in dependent variables than summated rating scales that construct their scale scores by averaging rating scores across a set of items assumed to represent how the respondent perceives the object of interest [27-31].

For the structure of items that measure values and their components, we predict that the Schwartz value circle is replicated at the level of the basic values (and, approximately, also at the level of their indicator items) but that security—if measured in a non-focused way—does not exhibit a close relation to tradition and conformity (as in **Figure 1**), because striving for security should, for many people, also be related to emphasizing health issues, preserving the natural environment, seeking reliable social partners and valuing other conditions related more to the primary social environment.

Moreover, we expect that this value structure is similar for persons of all ages because previous studies have shown that only the weights assigned to different values change systematically with age, but the structure of the values remains essentially stable [7,11]. What this means for an individual is easiest to understand in the ideal-point unfolding model [32]. The individual must seek a compromise in his/her striving for various values. Given that the values form a geometric structure as in **Figure 1**, this compromise defines the person's ideal point in value space. If the person shifts his/her ideal point closer to value X, he/she automatically moves away from values opposing X. Hence, changing value priorities does not necessarily imply a change in the structure of the values [10].

For gender, there is a tendency for women to be closer to self-transcendence than men who tend to prioritize self-enhancement [33]. The value circle, however, is essentially the same for men and women. Hence, we do not predict that the role of security differs for men and women.

More clarity about the role of security within the system of personal values is important because different studies use different measurement instruments. Based on the data collected, evidence-based actions are often planned and implemented, in particular in organizational contexts. Such actions are likely to be effective only if what is measured corresponds to what is meant by the employees.

2. Method

2.1 Samples

Our data come from surveys focusing on fear of crime and crime prevention in six German cities: Freiburg (F), Heidelberg (HD), Mannheim (MA), Pforzheim (PF), and Friedrichshafen (FN); all cities are located in the state of Baden-Württemberg [9,12,34]. All samples were random samples of citizens registered in these cities. The minimum age was 14 years in each sample.

The surveys were conducted in the period from 1998 to 2022. The FH98, HD09, and HD17 surveys were run as mail surveys. The MA12, MA16, and MA20 surveys were mixed mail and online surveys. The PF20 and FN22 surveys were online surveys.

All surveys were anonymous. No incentives were offered for participating in the surveys. However, a letter signed by the mayor of the respective city asked the selected persons to support the city's administration by providing data needed to prevent crimes. The time window of data collection was three weeks in all surveys.

The surveys varied in their sample size between 5,000 and 16,000 persons. The return rates were about 30% in each survey. This compares well to the participation rate of the (interviewer-based) European Social Survey in Germany [35]. The realized sample sizes ranged from 28% (HD09) to 36% (MA16), with 24,000 persons overall. The demographics of the participants compared closely to the demographics of the respective populations. Females were slightly over-represented (by about 5%), and older persons (aged 40 years or older) were also somewhat over-represented (by about 6%).

2.2 Measurement instruments

The questionnaires used in the surveys contained mostly questions focusing on problems related to crimes such as the respondents' and their relatives' history of victimization, the respondents' social capital, their perception of political and economic threats, their fear of crime, their subjective well-being, and their opinions on the city's actions to prevent crime.

Each survey used the IRVS scale to measure personal values with the items shown in **Table 1**. In three surveys (MA16, HD17, and PF20), the PVQ21 (German version [36]) was also employed in addition to the IRVS.

The items of the IRVS are introduced as follows: "People have certain ideas that govern their life and their thinking. We are interested in your ideas. Please consider what you are really after in your life: How important are the things and life orientations that we have listed here? Please take a look at the various issues and mark on a scale from 1 to 7 how important they are for you. 'Seven' means that it is very important, and 'one' means that it is completely unimportant. With the values in between, you can grade the importance of the issues." [9]. [translated from German by author].

Of items #23 ("Believe in God") and #22 ("Religion and religious faith"), only one item was used in each survey. Items #34 to #40 were not employed in every survey (see the "NA" entries in **Table 1**). Hence, the statistical results for these items are based on fewer respondents than items asked in all surveys. Two items (#38, #40) were presented in only one survey each. However, the number of respondents is still large in each case (4,111 and 5,198, respectively). The order of the items in the questionnaires was always as shown in **Table 1**. Item #1 "Respecting law and order" was always the first item.

All surveys asked for the respondents' gender and age. Age was measured in years or decades, and then always recorded into the categories 1 = "up to 19 years", 2 = "20-29 years", etc. up to "80+".

2.3 Statistical data analysis

All statistical analyses were run in the R environment [37]. For Multidimensional Scaling (MDS) of the item inter-correlations, the R-package SMACOF [38] was utilized. The default of all MDS analyses was ordinal MDS and a 2-dimensional solution space with a Torgerson starting configuration. The model fit of the MDS solution (*Stress*) was assessed utilizing both random benchmarks and permutation tests [39]. The rating scores of all items on personal values were centered, person by person, so that the ratings should be interpreted as relative importance scores, where "relative" means "relative to the individual's mean importance ratings".

All MDS solutions were fitted to the overall MDS solution in **Figure 1** by Procrustean transformations. Such transformations eliminate meaningless differences between any two MDS configurations, i.e. differences that are not based on the data [40]. The similarity of any two configurations was measured by Pearson correlations across the point coordinates and tested for statistical significance using permutation tests [41].

3. Results

We first check the structure of Schwartz's ten basic values based on the data collected by the PVQ in three surveys (MA16, HD17, PF20) with N=8,272. The MDS representation of the inter-correlations of the basic values is shown in **Figure 2** (left panel). The model fit is excellent (*Stress* = 0.02) and highly significant. The solution largely supports the theoretical expectations: (1) The points representing the various values form an almost perfect circle; (2) the wedge-like sectors of the four higher-order values (see gray partitioning lines in the plot) contain the ten personal values as predicted; they also satisfy the predicted oppositions of the higher-order values; and (3) the value points are ordered on the circle as theoretically predicted by Schwartz [1]. One notice, in particular, that security (SE) is positioned close to

tradition (TR) and conformity (CO). All three values form the higher-order value conservation which lies opposite of self-direction and the openness-to-change values.

The right-hand side panel of **Figure 2** exhibits the MDS structure of the 21 items of the PVQ21. Its fit is *Stress* = 0.106**. The *Stress-per-point* indices range from 2.0% to 7.8%, with an expected contribution percentage of 1/21 or 4.8% per point to the global Stress. Thus, no item can be identified as a misfit or outlier.

Substantively, **Figure 2** (right-hand side) shows that all items constructed to measure the same basic value are close to each other. In particular, the two items measuring security (se1 and se2) are close neighbors. They also lie in the region of the items that measure TR and CO. Moreover, the configuration of PVQ items supports the theoretical value circle. Security, thus, appears to be a conservative value.

To compare the PVQ-based MDS structure with the IVRS-based observations, we first combine all eight surveys into one joint data set with 24,000 persons and 40 items. Scaling the inter-correlations of these items with MDS leads to a solution with *Stress* = 0.175**. The MDS plot in **Figure 3** exhibits the higher-order value "dimensions" predicted by Schwartz [1,12]. One notice on the North-West side personal values of the Conservation type, opposes values of the Openness-to-Change group at the bottom of the plot. The Self-Enhancement vs. Self-Transcendence type values are found in the South-East and the North-West directions, respectively.

Regarding security, the MDS plot shows that people who strive for security also stress, in particular, the importance of respecting law and order, having a good family life, having a clear conscience, having inner peace and harmony, and healthy living as guiding principles for their lives. What they find relatively unimportant is having an exciting life or having power and influence. Striving for security, moreover, is not closely linked to conservation values.

Figure 4 shows the MDS configurations for men (N = 10,630) and women (N = 12,758) separately. The fit values of these solutions are *Stress* = 0.195** and 0.190**, respectively. The solutions are similar to the global solution. Measured objectively, they correlate with the global solution in **Figure 2** with r = 0.970** and 0.980**, respectively.

Figure 5 shows the MDS configurations of three age cohorts, with age "< 30" (N = 5,004), "30-49" (N = 7,486), and "50+" (N = 6,709), and with *Stress* = 0.170**, 0.193**, and 0.170**, resp. The plots are similar to the overall plot in **Figure 2**. Measured objectively, the similarities are r = 0.814**, 0.959**, and 0.974**, respectively. Thus, the youngest age

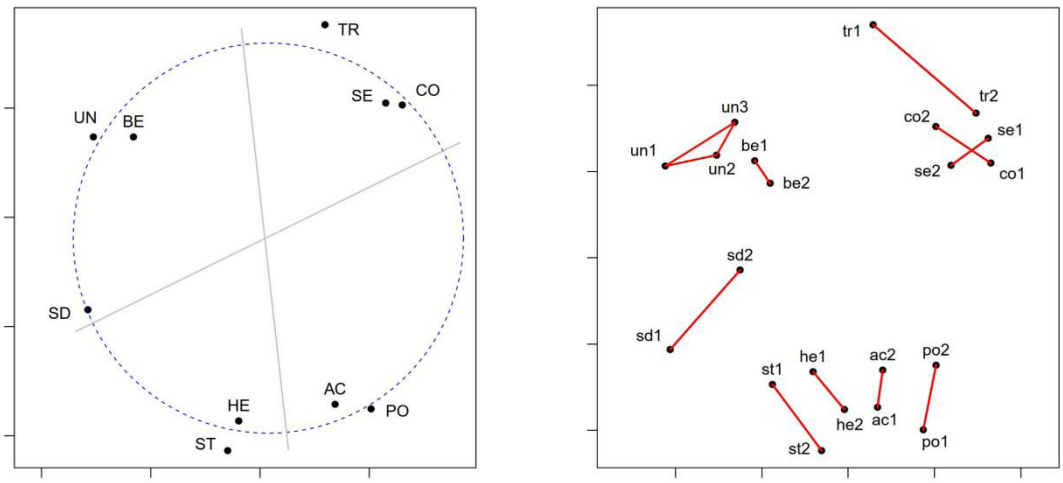

Figure 2. Left panel: MDS plot of the ten basic values of the Schwartz model, measured by the PVQ21 (N = 8,272); circle optimally fitted to points; gray lines partition the space into higher-order value regions. Right panel: MDS plot of the PVQ21 items; red lines connect items that theoretically measure the same basic values.

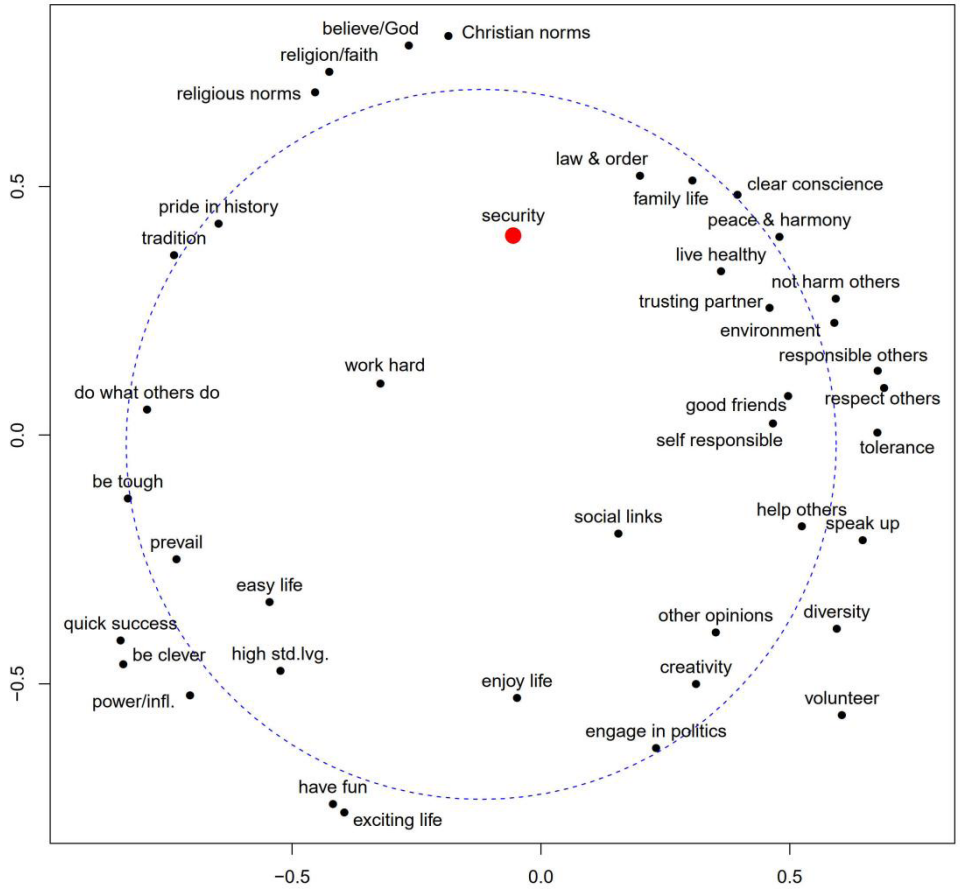

Figure 3. MDS plot of the inter-correlations of the items in **Table 1**; all samples combined (N = 24,000); the closer two points, the higher the correlation of the items that they represent; circle optimally fitted to points.

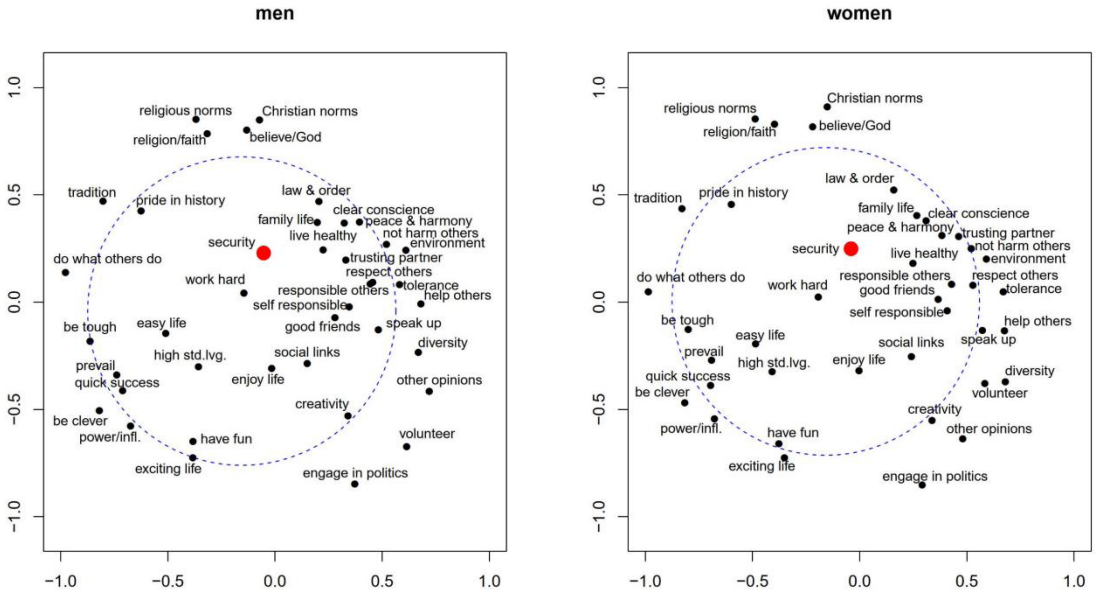

Figure 4. MDS plots of the inter-correlations of the items in **Table 1** for male and female subsamples of all samples combined; circles optimally fitted to points.

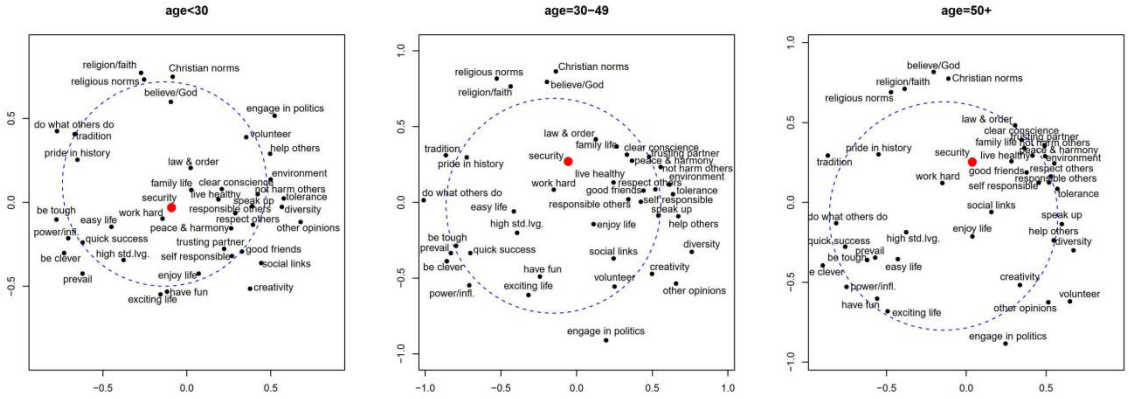

Figure 5. MDS plots of the inter-correlations of the items in **Table 1** for three age cohorts of all samples combined; circles optimally fitted to points.

cohort deviates most from the overall configuration, but the relation of security to other values exhibits the same neighborhood relations to values such as "law & order", "work hard", "live healthy", or "tradition". One notes, moreover, that the cluster of social-emotional values in **Figure 5** tends to become more compact with age. Thus, older persons rate the importance of these values more similarly than younger persons who differentiate more among these values.

Table 1 exhibits the correlations of item #5 ("Striving for security") with the other IRVS items, shown separately for each survey. The surveys are ordered according to the year in which they were conducted: HD98 was run in 1998, and FN22 in 2021. This allows seeing systematic time-related trends in how overall security correlates with each of the other items. However, no item shows such a trend in a magnitude that would be noteworthy.

One notices in **Table 1** that the persons' reported relative strength of striving for security is most positively correlated with their (relative) importance ratings of item #1 ("Respecting law and order"), item #8 ("Working hard and being ambitious") and item #15 ("Living a good family life"). The largest negative correlations are found for items #29 ("Living an exciting life"), #10 ("Engaging oneself in politics"), and #3 ("Having power and influence").

Table 1 also shows the correlations of the importance ratings with the respondents' age. They show that the subjective importance of values of the Openness-to-Change and Self-Enhancement groups is decreasing with age, while those related to Conservation are increasing. The magnitudes of the correlations are remarkably similar to the correlations reported in Borg [42], although here we use relative (i.e., centered) importance ratings, not the observed ratings as in the Borg study. Thus, one can conclude once more that the weights of the various values and their components are systematically changing with age, while the structure of the system of values (**Figure 5**) remains largely stable.

Table 1. Correlations of (centered) ratings of 40 IRVS items on personal values with ratings on item #5 ("Striving for security"); eight surveys FH98 ... FN22; "NA" = missing value, i.e. the item was not used in the particular survey; *r*(item, age) = correlations of (centered) item scores with respondents' age.

	Item	FH 98	HD 09	MA 12	MA 16	HD 17	MA 20	PF 20	FN 22	r(item, age)
N		2,930	1,581	1,908	3,272	2,770	5,198	2,230	4,111	
1	Respecting law and order	0.31	0.37	0.32	0.31	0.36	0.33	0.31	0.31	0.19
2	Having a high standard of living	0.11	0.05	0.11	0.00	0.08	0.11	0.05	0.07	–0.13
3	Having power and influence	–0.12	–0.16	–0.11	–0.20	–0.16	–0.15	–0.23	–0.16	–0.15

Table 1 continued

	Item	FH 98	HD 09	MA 12	MA 16	HD 17	MA 20	PF 20	FN 22	r(item, age)
4	Using your own ideas and creativity	–0.10	–0.02	–0.05	0.05	0.00	0.02	0.01	0.05	–0.11
5	Striving for security	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.04
6	Helping socially disadvantaged groups	–0.05	–0.01	–0.06	0.02	–0.03	–0.02	0.00	0.03	0.04
7	Asserting one's needs and prevailing over others	0.01	–0.03	0.01	–0.03	0.01	–0.01	–0.04	–0.03	–0.05
8	Working hard and being ambitious	0.18	0.18	0.17	0.17	0.18	0.19	0.20	0.21	–0.07
9	Respecting opinions you don't agree with	–0.14	–0.10	–0.12	–0.03	–0.07	–0.10	–0.04	–0.05	–0.10
10	Engaging yourself in politics	–0.23	–0.26	–0.22	–0.18	–0.21	–0.23	–0.16	–0.19	–0.01
11	Enjoying the good things in life	–0.10	–0.05	–0.04	0.03	0.05	0.06	0.11	0.04	–0.20
12	Living and acting on your responsibility	–0.13	0.05	–0.01	0.11	0.11	0.09	0.18	0.07	–0.03
13	Doing what others are doing	–0.09	–0.06	–0.05	–0.12	–0.14	–0.15	–0.24	–0.14	0.04
14	Adhering to traditions	0.02	0.07	0.07	–0.01	0.00	–0.01	–0.08	–0.02	0.19
15	Living a good family life	0.19	0.20	0.11	0.17	0.15	0.15	0.21	0.15	0.09
16	Being proud of German history	0.08	0.03	0.08	–0.03	0.05	0.05	–0.03	0.00	0.25
17	Having a partner one can rely on	0.03	0.03	0.06	0.09	0.05	0.05	0.18	0.07	–0.02
18	Having good friends who respect and accept you	–0.11	–0.04	–0.04	–0.02	–0.01	0.04	0.09	–0.01	–0.10
19	Having a lot of contact with others	–0.14	–0.13	–0.11	–0.11	–0.10	–0.12	–0.07	–0.13	0.01
20	Healthy living	0.03	0.06	0.12	0.02	0.05	0.08	0.07	0.05	0.08
21	Behaving environmentally conscious	–0.05	0.00	–0.04	0.02	0.00	0.01	0.06	0.03	0.16
22	Believe in God	0.00	0.02	NA	–0.04	NA	NA	–0.10	NA	0.17
23	Religion and religious faith	NA	NA	–0.05	NA	–0.06	–0.05	NA	NA	0.21
24	Having a clear conscience	0.07	0.10	0.02	0.18	0.11	0.12	0.13	0.12	0.12
25	Living by Christian norms and values	–0.02	–0.03	NA	–0.06	NA	NA	–0.10	NA	0.28
26	Living by religious norms and values	NA	NA	–0.04	NA	–0.10	–0.09	NA	NA	0.23
27	Living so that others are not harmed	–0.06	0.07	–0.05	0.15	0.08	0.05	0.12	0.10	0.09
28	Living an exciting life	–0.31	–0.33	–0.24	–0.24	–0.25	–0.25	–0.26	–0.25	–0.35
29	Living an easy and comfortable life	0.09	0.04	0.10	0.04	0.05	0.09	0.01	0.03	–0.06
30	A life full of enjoyment	–0.17	–0.20	–0.11	–0.14	–0.14	–0.14	–0.15	–0.15	–0.40
31	Inner peace and harmony	0.05	0.12	0.02	0.14	0.12	0.14	0.12	0.10	0.10
32	Being hard and tough	–0.03	–0.11	–0.09	–0.17	–0.08	–0.11	–0.17	–0.12	0.00
33	Having quick success	0.01	–0.08	–0.06	–0.16	–0.12	–0.13	–0.17	–0.15	–0.21
34	Being clever and smarter than others	–0.02	–0.15	–0.08	–0.17	–0.15	–0.15	–0.18	–0.18	–0.28
35	Showing moral courage	NA	NA	–0.16	NA	–0.06	–0.10	–0.03	–0.03	–0.05
36	Respecting others	NA	NA	–0.09	NA	0.05	0.02	0.11	0.04	–0.04
37	Taking responsibility for others	NA	NA	NA	NA	NA	NA	0.05	–0.03	0.06
38	Engaging in volunteer work	NA	NA	NA	NA	NA	NA	NA	–0.16	0.07
39	Tolerance	NA	NA	–0.13	NA	–0.09	NA	NA	NA	0.03
40	Promoting a diverse society	NA	NA	NA	NA	NA	–0.20	NA	NA	–0.08

4. Discussion

We have shown that strongly striving for security is positively related not only to high importance ratings for rules and order as guiding principles in one's life, but also to prioritizing the importance of hard work, pursuing a good family life, living health-consciously, striving for a clear conscience, and for peace and harmony. People's orientations toward tradition are correlated with their striving for security, and, not surprisingly, the more people prioritize excitement and power, the less they are seeking security.

The psychological neighborhood of security to other values and value components found here would not have been observed if we had used the PVQ21 to measure the values. With this instrument, security is predictably closely related to tradition and conformity (see **Figure 2**). This is important to know because the PVQ21 is probably today's most frequently used instrument for measuring personal values. That is not to say that the results of the PVQ21 are wrong, but they express a particular notion of security that may not fully correspond to what many people mean by security as a guiding principle. Important components of what security means to people are simply not addressed by the PVQ21. The PVQ21-based index of security relies on items that assess a particular and more patriarchal type of security rather than the security generated by the person's primary environment. Thus, it is not surprising that the PVQ21-based index of security as a personal value is highly correlated with tradition and conformity.

More generally, one should take it for granted that none of the basic values is a simple psychological object but rather a *multi-dimensional notion* that is *rich in components and facets*. The predictive power of personal values for attitudes and behavior, therefore, depends on numerous side constraints and, in particular, on the items used to measure them. Yet, the meaning of the issues that the items focus on can differ for different sub-samples (as, for example, the notion of freedom that changes systematically as people get older [7]). Moreover, value components not used by the instruments may become important as the culture changes (e.g., healthy living, racism, diversity, fear of war); or old components become irrelevant (e.g., religion). In such cases, the given instruments need to be adapted.

A further question concerning the role of security—or of any basic value and its components, for that matter—is asking in which way they are not just correlated but functionally related to each other. One such relationship is articulated in the distinction of values as either instrumental or terminal ones. According to Rokeach [17], security is an instrumental value that only serves the achievement of terminal values. Yet, based on extensive empirical data, Schwartz [43] concluded that there is "little support for the idea that the terminal-instrumental distinction is a meaningful basis on which people organize their values" (p. 37). Thus, because of its empirical ineffectiveness, this distinction has largely vanished from today's theories of personal values. On the other hand, thinking in categories of what is a driver, and what an outcome, may still be theoretically useful to better understand the observed relations of closeness and distance. An example is "working hard and being ambitious" and "security", where the former is most likely perceived as a driver of security. Similarly, "living an exciting life" is probably associated with higher levels of risk, and so it would contribute negatively to security. Security, on the other hand, may be seen as a resource that drives a good family life. Other relations of closeness may be based on semantics as, for example, the closeness of "law & order" and security, where "law & order" is simply a component of safety, not an outcome or a driver of safety. Exploring such explanations for the psychological maps exhibited by the MDS configurations could be interesting in future research and lead to insights that can help HR managers to improve people's feelings of security.

Finally, a more technical comment. In the above MDS analyses, we always used centered rating data. That is, we first subtracted the persons' ratings from their mean ratings, person by person. This is often done in value research to correct for each person's response style or because what one wants is each

person's *relative* importance ratings, where relative means relative to his/her anchor of judgment. We centered the data primarily to make the results comparable to other research in the personal value domain. If one does not center the data, thus analyzing the observed ratings without any preprocessing transformations, the MDS results are somewhat different: The points are spread more evenly through the value space, leading to more points in the central region, with security moving closer to the center of the value circle. Substantively, this leads to the same conclusions. The correlations of the various IRVS items with item #5 are also affected: Their magnitude is higher. For example, for observed ratings, the correlation of items #5 and #1 jumps to 0.50 (on average) compared to 0.33 for the correlations shown in **Table 1**. However, the pattern of high positive and high negative correlations remains the same.

Conflict of Interest

There is no conflict of interest.

References

[1] Schwartz, S.H., Bilsky, W., 1987. Toward a universal psychological structure of human values. Journal of Personality and Social Psychology. 53(3), 550-562.
DOI: https://doi.org/10.1037/0022-3514.53.3.550

[2] Maio, G.R., 2010. Mental representations of social values. Advances in Experimental Social Psychology. 42, 1-43.
DOI: https://doi.org/10.1016/S0065-2601(10)42001-8

[3] Fischer, R., 2017. Personality, values, culture. Cambridge University Press: Cambridge.
DOI: https://doi.org/10.1017/9781316091944

[4] Schwartz, S.H., Bilsky, W., 1990. Toward a theory of the universal content and structure of values: Extensions and cross-cultural replications. Journal of Personality and Social Psychology. 58, 878-891.
DOI: https://doi.org/10.1037/0023514.58.5.878

[5] Schwartz, S., Cieciuch, J., Vecchione, M., et al., 2012. Refining the theory of basic individual values. Journal of Personality and Social Psychology. 103, 663-688.
DOI: https://doi.org/10.1037/a0029393

[6] Biber, P., Hupfeld, J., Meier, L.L., 2008. Personal values and relational models. European Journal of Personality. 22, 609-628.
DOI: https://doi.org/10.1002/per.693

[7] Borg, I., Herman, D., Bilsky, W., 2017. A closer look at personal values and delinquency. Personality and Individual Differences. 116, 171-178.
DOI: https://doi.org/10.1016/j.paid.2017.04.043

[8] Schwartz, S.H., 2003. A proposal for measuring value orientations across nations. Questionnaire Development Package of the European Social Survey. pp. 259-319. Available from: https://www.europeansocialsurvey.org/docs/methodology/core_ess_questionnaire/ESS_core_questionnaire_human_values.pdf

[9] Hermann, D., 2014. Individuelle reflexive Werte (German) [Individual reflexive values]. Available from: https://zis.gesis.org/skala/Hermann-Individuelle-reflexive-Werte

[10] Borg, I., Hertel, G., Hermann, D., 2017. Age and personal values: Similar value circles with shifting priorities. Psychology and Ageing. 32, 636-641.
DOI: https://doi.org/10.1037/pag0000196

[11] Borg, I., 2019. Age- and gender-related differences in the structure and the meaning of personal values. Personality and Individual Differences. 138, 336-343.
DOI: https://doi.org/10.1016/j.paid.2018.10.013

[12] Borg, I., Hermann, D., Bilsky, W., et al., 2019. Do the PVQ and the IRVS scales for personal values support Schwartz's value circle model or Klages' value dimensions model? Measurement Instruments for the Social Sciences. 2(3), 1-14.
DOI: https://doi.org/10.1186/s42409-018-0004-2

[13] Schwartz, S.H., 2012. An overview of the Schwartz theory of basic values. Online Readings in Psychology and Culture. 2(1), 2307-0919.
DOI: https://doi.org/10.9707/2307-0919.1116

[14] Schwartz, S.H., 2017. The refined theory of basic values. Values and behavior: Taking a cross

cultural perspective. Springer International Publishing: Berlin. pp. 51-72.
DOI: https://doi.org/10.1007/978-3-319-56352-7_3

[15] Hanel, P.H.P., Litzellachner, L.F., Maio, G.R., 2018. An empirical comparison of human value models. Frontiers in Psychology. 9, 1643.
DOI: https://doi.org/10.3389/fpsyg.2018.01643

[16] Schwartz, S.H., 2021. A repository of Schwartz value scales with instructions and an introduction. Online Readings in Psychology and Culture. 2(2), 9.
DOI: https://doi.org/10.9707/2307-0919.1173

[17] Rokeach, M., 1973. The nature of human values. The Free Press: New York.

[18] Haslam, N., 2004. Relational models theory: A contemporary overview. Lawrence Erlbaum Associates Inc.: Mahwah.

[19] Aavik, T., Allik, J., 2002. The structure of Estonian personal values: A lexical approach. European Journal of Personality. 16(3), 221-235.
DOI: https://doi.org/10.1002/per.439

[20] Renner, W., 2003. Human values: A lexical perspective. Personality and Individual Differences. 34, 127-141.
DOI: https://doi.org/10.1016/S0191-8869(02)00037-5

[21] Ponizovskiy, V., Ardag, M., Grigoryan, L., et al., 2020. Development and validation of the personal values dictionary: A theory-driven tool for investigating references to basic human values in text. European Journal of Personality. 34(5), 885-902.
DOI: https://doi.org/10.1002/per.2294

[22] Maslow, A.H., 1942. The dynamics of psychological security-insecurity. Character & Personality; A Quarterly for Psychodiagnostic & Allied Studies, 10, 331–344.
DOI: https://doi.org/10.1111/j.1467-6494.1942.tb01911.x

[23] Dzhamalova, B.B., Magomedov, G.B., Amirkhanov, A.A., et al., 2016. Anthropological mechanisms of self-management of personality behavior. International Review of Management and Marketing. 6(2), 383-389. Available from https://econjournals.com/index.php/irmm/article/view/2175

[24] Belic, J., Djordjevic, A., Nikitović, T., et al., 2022. The diversity of value construal: A constructivist approach to the Schwartz theory of basic values. Journal of Constructivist Psychology. 35(4), 1276-1300.
DOI: https://doi.org/10.1080/10720537.2021.1965510

[25] Restle, F., 1959. A metric and an ordering on sets. Psychometrika. 24, 207-220.
DOI: https://doi.org/10.1007/BF02289843

[26] Willis, G.B., 2005. Cognitive interviewing: A tool for improving questionnaire design. SAGE Publications, Inc.: Thousand Oaks, CA.

[27] Allen, M.S., Iliescu, D., Greiff, S., 2022. Single item measures in psychological science: A call to action. European Journal of Psychological Assessment. 38(1), 1-5.
DOI: https://doi.org/10.1027/1015-5759/a000699

[28] Fisher, G.G., Matthews, R.A., Gibbons, A.M., 2016. Developing and investigating the use of single-item measures in organizational research. Journal of Occupational Health Psychology. 21(1), 3-23.
DOI: https://doi.org/10.1037/a0039139

[29] Matthews, R.A., Pineault, L., Hong, Y.H., 2022. Normalizing the use of single-item measures: Validation of the single-item compendium for organizational psychology. Journal of Business and Psychology. 37, 639-673.
DOI: https://doi.org/10.1007/s10869-022-09813-3

[30] Nagy, M.S., 2002. Using a single-item approach to measure facet job satisfaction. Journal of Occupational and Organizational Psychology. 75(1), 77-86.
DOI: https://doi.org/10.1348/096317902167658

[31] Wanous, J.P., Reichers, A.E., Hudy, M.J., 1997. Overall job satisfaction: How good are single-item measures? Journal of Applied Psychology. 82(2), 247-252.
DOI: https://doi.org/10.1037/0021-9010.82.2.247

[32] Borg, I., Bardi, A., Schwartz, S., 2017. Does the value circle exist within persons or only across

persons? Journal of Personality. 85(2), 151-162. DOI: https://doi.org/10.1111/jopy.12228

[33] Schwartz, S.H., Lifschitz, T.R., 2005. Sex differences in value priorities: Cross-cultural and multi-method studies. Journal of Personality and Social Psychology. 89(6), 1010-1028. DOI: https://doi.org/10.1037/0022-3514.89.6.1010

[34] Hermann, D. & Wachter, E. 2020. *Pforzheimer Sicherheitsaudit 2020*. [Security audit in Pforzheim.] http://www.praeventionsverein-pf.de/sicherheitsaudit-2020.pdf

[35] Jowell, R., Roberts, C., Fitzgerald, R., et al., 2007. Measuring attitudes cross-nationally: Lessons from the European Social Survey. Sage: London.

[36] Schmidt, P., Bamberg, S., Davidov, E., et al., 2007. Die messung von werten mit dem "Portraits Value Questionnaire" (German) [The measurement of values with the "Portrait Value Questionnaire"]. Zeitschrift für Sozialpsychologie. 38(4), 261-275.

[37] The R Project for Statistical Computing [Internet]. [cited 2021 Nov 4]. Available from: http://www.R-project.org/

[38] De Leeuw, J., Mair, P., 2009. Multidimensional scaling using majorization: SMACOF in R. Journal of Statistical Software. 31(3), 1-30. DOI: https://doi.org/10.18637/jss.v031.i03

[39] Mair, P., Borg, I., Rusch, T., 2016. Goodness-of-fit assessment in multidimensional scaling and unfolding. Multivariate Behavioral Research. 51, 772-789. DOI: https://doi.org/10.1080/00273171.2016.1235966

[40] Borg, I., Groenen, P.J.F., Mair, P., 2018. Applied multidimensional scaling and unfolding (2nd ed.). Springer: New York. DOI: https://doi.org/10.1007/978-3-319-73471-2

[41] Borg, I., Mair, P., 2022. A note on Procrustean fittings of noisy configurations. Austrian Journal of Statistics. 51(4), 1-9. DOI: https://doi.org/10.17713/ajs.v51i4.1423

[42] Borg, I., Hermann, D., 2021. Inside and outside perspectives on the relation of people's personal values and their acceptance of legal norms. Macro Management & Public Policies. 3(4), 1-13. Available from: https://ojs.bilpublishing.com/index.php/mmpp/article/view/4178

[43] Schwartz, S.H., 1992. Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. Advances in Experimental Social Psychology. 25, 1-65. DOI: https://doi.org/10.1016/S0065-2601(08)60281-6

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ARTICLE

Impact of Environmental, Social, and Governance (ESG) Factors on Stock Prices and Investment Performance

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ABSTRACT

This study examines the relationship between Environmental, Social, and Governance (ESG) factors and stock prices as well as investment performance. ESG factors have become increasingly relevant in investment decisions as investors prioritize companies with sustainable practices. Using a sample of publicly-traded companies, this research analyzes the impact of ESG factors on stock prices and investment returns. The findings suggest that companies with strong ESG performance tend to have higher stock prices and better investment performance than those with weak ESG performance. The study also highlights the significance of the individual components of ESG, such as environmental policies and corporate governance practices, on stock prices and investment returns. Overall, this research provides valuable insights for investors seeking to incorporate ESG factors into their investment decision-making processes.

Keywords: ESG factors; Stock price; Investment performance

1. Introduction

Environmental, social, and governance (ESG) factors have become increasingly important considerations for investors in recent years [1]. As investors have become more focused on the long-term sustainability of companies and their impact on society and the environment, ESG has emerged as a critical lens

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through which to evaluate investment opportunities. ESG factors refer to a company's performance in areas such as carbon emissions, human rights, diversity and inclusion, executive compensation, and board governance [2,3]. These factors can have a significant impact on a company's reputation, operations, and financial performance. As such, they are increasingly being integrated into investment decision-making processes [4]. Research on the impact of ESG factors on stock prices and investment performance has gained traction in recent years [5].

Studies have shown that companies with strong ESG performance tend to outperform their peers over the long term, indicating that investors who prioritize ESG considerations may be able to generate superior returns [6]. However, there is still much to be learned about the impact of ESG on capital markets. For example, questions remain about the effectiveness of ESG ratings and how different ESG factors affect stock prices and investment performance. Further research is needed to provide investors with a better understanding of the role ESG factors play in investment decision-making and how to incorporate them into investment strategies effectively.

Despite the growing interest in ESG factors in investment decision-making, there is a lack of consensus on the extent to which ESG factors impact stock prices and investment performance. Prior research has produced mixed results, with some studies finding a positive relationship between ESG performance and financial performance, while others have found no significant relationship. Moreover, most of the existing literature has focused on developed markets and large-cap companies, leaving a gap in our understanding of the impact of ESG factors on smaller companies and emerging markets. Therefore, this research aims to fill this gap by examining the relationship between ESG factors and stock prices as well as investment performance in a broader range of companies, including small-cap and emerging market firms.

1.1 Research problem

The research problem is to investigate the impact of Environmental, Social, and Governance (ESG) factors on stock prices and investment performance. ESG factors have become increasingly important in the investment world as investors seek to balance financial returns with social and environmental responsibility. The study will explore whether companies that prioritize ESG factors have higher stock prices and better investment performance compared to companies that do not prioritize ESG factors. The research will help investors make more informed decisions by understanding the relationship between ESG factors and investment outcomes.

1.2 Objectives

- To assess the relationship between ESG factors and stock prices and investment performance.
- To evaluate the effectiveness of ESG ratings in predicting stock prices and investment performance.
- To identify the specific ESG factors that have the most significant impact on stock prices and investment performance.

2. Literature review

2.1 Relationship between ESG factors and stock prices and investment performance

The relationship between environmental, social, and governance (ESG) factors and stock prices and investment performance has been the subject of significant research in recent years. Several studies have found a positive correlation between a company's ESG performance and its financial performance [7-9]. For example, a study by Arabesque Asset Management found that companies with high ESG scores tended to have higher profitability and lower costs of capital, suggesting that ESG factors are an important consideration for investors. Similarly, a study by MSCI found that companies with high ESG ratings tended to have lower volatility and higher returns on equity [10].

Other studies have found that companies with

poor ESG performance tend to underperform their peers [11]. A study by Deutsche Bank found that companies with low ESG scores were more likely to experience reputational damage and regulatory penalties, which in turn led to lower stock prices and higher costs of capital [12]. Similarly, a study by Harvard Business School found that companies with poor environmental performance tended to have lower stock prices and higher risk premiums [13]. ESG ratings have also emerged as an important tool for investors seeking to incorporate ESG factors into their investment decision-making processes [14]. Several studies have found that ESG ratings can be effective in predicting stock prices and investment performance. For example, a study by Morningstar found that companies with high ESG ratings tended to outperform their peers over the long term, suggesting that investors who prioritize ESG considerations may be able to generate superior returns [15,16].

However, there is still much debate over the effectiveness of ESG ratings, as different rating agencies may use different methodologies and weightings for different ESG factors [17]. Additionally, there is still much to be learned about the specific ESG factors that have the most significant impact on stock prices and investment performance [18]. Overall, the literature suggests that ESG factors are becoming increasingly important considerations for investors, and that companies with strong ESG performance may be better positioned to generate long-term value for their shareholders. However, further research is needed to provide investors with a better understanding of the impact of ESG factors on stock prices and investment performance and how to incorporate these factors into investment strategies effectively.

The relationship between environmental, social, and governance (ESG) factors and stock prices and investment performance has been extensively studied in recent years. However, there is a lack of consensus on whether these relationships are consistent across different industries and regions. Several studies have found that companies with strong ESG performance tend to outperform their peers in terms of stock prices and investment performance across various industries and regions [19]. For example, a study by Bassen found that companies with higher ESG ratings had higher stock returns and lower volatility compared to companies with lower ESG ratings [20]. Another study by Ferrero and others found that companies with high ESG ratings outperformed their peers in terms of stock returns in both developed and emerging markets [21]. However, other studies have found mixed or inconclusive results regarding the relationship between ESG factors and stock prices and investment performance across different industries and regions. For example, a study by Khalil and others found that the relationship between ESG factors and financial performance varied across different industries and regions, with stronger relationships observed in industries with higher environmental and social risks [22,23]. Another study by Rooh and others found that the relationship between ESG factors and stock returns was stronger in developed markets compared to emerging markets [24].

Moreover, some studies have found that the relationship between ESG factors and stock prices and investment performance may depend on the specific ESG factors being considered. For example, a study by Cek and others found that companies with higher scores on environmental and social factors had higher stock returns, while companies with higher scores on governance factors had lower stock returns [25]. In conclusion, the existing literature suggests that the relationship between ESG factors and stock prices and investment performance may vary across different industries and regions, and may depend on the specific ESG factors being considered. Further research is needed to explore these relationships in more detail and to identify the factors that influence the consistency of these relationships across industries and regions.

2.2 ESG ratings in predicting stock prices and investment performance

The effectiveness of environmental, social, and governance (ESG) ratings in predicting stock prices

and investment performance has been the subject of much research and debate in recent years. Several studies have found a positive correlation between a company's ESG rating and its financial performance [26-28]. For example, a study by MSCI found that companies with high ESG ratings tended to have higher returns on equity and lower volatility than their peers with lower ESG ratings [29]. Similarly, a study by Harvard Business School found that companies with high ESG ratings tended to have higher stock prices and lower risk premiums [30]. Other studies have questioned the effectiveness of ESG ratings in predicting stock prices and investment performance. For example, a study by the University of St. Gallen found that ESG ratings had limited ability to predict stock prices in the short term, but were more effective in predicting long-term performance [31]. Similarly, a study by Harvard Business Review found that while there was a positive correlation between ESG performance and financial performance, the relationship was not strong enough to be a reliable predictor of stock prices [32].

One challenge with ESG ratings is that different rating agencies may use different methodologies and weightings for different ESG factors. This can lead to inconsistencies in the ratings, making it difficult for investors to compare companies and make informed investment decisions [18,33]. Additionally, some critics have argued that ESG ratings may be too focused on the inputs (i.e., a company's policies and procedures) rather than the outputs (i.e., the company's actual impact on the environment, society, and governance) [34]. Despite these challenges, many investors continue to use ESG ratings as a tool for incorporating ESG factors into their investment decision-making processes [35]. The Global Sustainable Investment Alliance reported that assets invested in sustainable and responsible investment strategies increased to $31 trillion in 2018, up 34% from 2016 [36]. Overall, the literature suggests that while ESG ratings may have limitations in predicting short-term stock prices, they can be effective in predicting long-term investment performance. However, investors should be aware of the limitations and inconsistencies in ESG ratings and use them in conjunction with other tools and strategies to make informed investment decisions.

2.3 ESG factors and investors' investment decision

In recent years, there has been a growing trend among investors to incorporate environmental, social, and governance (ESG) factors into their investment decision-making processes. This trend has been driven by a variety of factors, including the growing recognition of the importance of sustainability and social responsibility, increasing regulatory requirements, and investor demand for ESG investments [15].

Several studies have examined how investors incorporate ESG factors into their investment decision-making processes and the impact of this on their investment performance [37,38]. These studies have found that investors use a variety of methods to incorporate ESG factors into their decision-making, including ESG ratings, exclusionary screens, and thematic investing.

ESG ratings are one of the most used methods for incorporating ESG factors into investment decision-making. These ratings are provided by independent rating agencies such as MSCI, Sustainalytics, and ISS ESG, and are used by investors to identify companies with strong ESG performance [6]. Studies have found that investors who use ESG ratings in their decision-making tend to outperform their peers who do not use these ratings [39]. Exclusionary screens are another commonly used method for incorporating ESG factors into investment decision-making. These screens are used to exclude companies that are involved in activities that are deemed to be socially or environmentally harmful. Studies have found that investors who use exclusionary screens tend to underperform their peers who do not use these screens [40]. Thematic investing is another method for incorporating ESG factors into investment decision-making. Thematic investing involves investing in companies that are focused on specific ESG themes such as clean energy or sustain-

able agriculture [41]. Studies have found that thematic investing can generate significant alpha for investors who are able to identify and invest in companies that are well-positioned to benefit from these themes [42].

Overall, the literature suggests that incorporating ESG factors into investment decision-making can have a positive impact on investment performance, especially when investors use ESG ratings or thematic investing. However, the impact of exclusionary screens on investment performance is less clear, and may depend on the specific criteria used for these screens. Further research is needed to better understand the impact of ESG factors on investment performance and to identify the most effective methods for incorporating these factors into investment decision-making.

3. Conceptual framework

The specific environmental, social, and governance (ESG) factors that are most closely correlated with stock prices and investment performance may vary depending on the industry, region, and company size. However, some studies have identified certain ESG factors that are consistently correlated with financial performance. Environmental factors, such as a company's carbon emissions and energy efficiency, have been found to be particularly relevant to investment performance [43]. For example, a study by the Harvard Business Review found that companies with good environmental performance tended to have higher stock prices and lower risk premiums than their peers with poor environmental performance [44]. Similarly, a study by MSCI found that companies with strong carbon management practices tended to have higher returns on equity and lower volatility [45].

Social factors, such as a company's labour practices and community engagement, have also been found to be relevant to investment performance [46]. A study by MSCI found that companies with strong labour practices tended to have higher returns on equity, while companies with poor community relations tended to underperform their peers [47]. Similarly, a study by Harvard Business School found that companies with high employee satisfaction tended to have higher stock prices and lower risk premiums [48]. Governance factors, such as a company's board structure and executive compensation, have long been recognized as important considerations for investors [49]. A study by Arabesque Asset Management found that companies with strong governance tended to have higher profitability and lower costs of capital [50]. Similarly, a study by MSCI found that companies with strong board independence tended to have higher returns on equity and lower volatility [51].

Overall, the literature suggests that environmental, social, and governance factors all play a role in determining stock prices and investment performance. However, the specific factors that are most relevant may vary depending on the industry, region, and company size, and investors should consider a range of ESG factors when making investment decisions.

The variables considered for a study on the impact of ESG factors on stock prices and investment performance include:

Environmental factors: These may include carbon emissions, water and energy usage, waste management, and other sustainability practices that can affect a company's environmental impact.

Social factors: These may include employee diversity, labor practices, community engagement, customer privacy, and other factors that can affect a company's social impact and reputation.

Governance factors: These may include board diversity, executive compensation, shareholder rights, and other factors that can affect a company's corporate governance practices.

Stock prices: This is a key variable in measuring the impact of ESG factors, as it reflects the market's perception of a company's financial performance and potential future growth.

Investment performance: This variable may include metrics such as returns, risk-adjusted returns, and portfolio volatility, which can help evaluate the impact of ESG factors on investment performance.

4. Research design

4.1 Data collection

The data for this study will be collected from several sources, including:

ESG data providers, such as MSCI ESG, Sustainalytics, and Bloomberg ESG, to obtain ESG ratings and scores for the companies in the sample. Financial databases, such as Compustat and CRSP, obtain financial data and stock prices for the companies of India in the sample. Industry reports, such as the GRI Sustainability Reporting Standards and the SASB Standards, obtain industry-specific ESG metrics. The sample will consist of publicly-traded companies in India across various industries. The data collected for the last five years (2022-2018). The sample selection criteria will include the following:

- Companies that have publicly available ESG ratings and scores from at least two ESG data providers.
- Companies that have financial data and stock prices available for at least five years.
- Companies that are not in the financial, utility, or real estate sectors, as these sectors have specific regulatory and accounting frameworks that may affect their ESG performance and financial performance.

4.2 Data analysis

The data analysis will be conducted in several stages:

Descriptive analysis: This stage will involve calculating summary statistics and distributions of the ESG and financial variables for the sample.

Correlation analysis: This stage will involve calculating Pearson correlations between the ESG and financial variables to examine the bivariate relationships.

Regression analysis: This stage will involve running multiple regression models to examine the multivariate relationships between ESG factors and financial performance, while controlling for other factors that may affect financial performance, such as company size, profitability, and industry characteristics.

4.3 Ethical considerations

This study will comply with ethical principles for research, including informed consent, confidentiality, and protection of human subjects. The data used in this study are publicly available and do not require informed consent. The study will not use any personal or identifiable information, and all data will be stored securely.

4.4 Limitations

This study has several limitations, including:

- The use of ESG ratings and scores may be subjective and may not fully capture a company's ESG performance.
- The sample selection criteria may limit the generalizability of the results to other industries or countries.
- The study may not account for all factors that affect financial performance, such as macroeconomic conditions or investor sentiment.

5. Results

5.1 Descriptive statistics

Table 1 presents the descriptive statistics for the ESG and financial variables. The mean ESG score for the sample is 60.3, with a standard deviation of 12.8. The mean market capitalization is $10.4 billion, with a standard deviation of $25.7 billion. The mean return on assets (ROA) is 5.7%, with a standard deviation of 7.8%. The mean five-year stock price return is 50.6%, with a standard deviation of 32.1%.

5.2 Correlation analysis

Table 2 presents the correlation matrix between the ESG and financial variables. The correlation coefficients show that there is a positive relationship between ESG scores and market capitalization

Table 1. Descriptive statistics.

Variable	Mean	Standard Deviation
ESG Score	60.3	12.8
Market Capitalization ($B)	10.4	25.7
Return on Assets (%)	5.7	7.8
5-Year Stock Price Return (%)	50.6	32.1

Table 2. Correlation matrix.

Variable	ESG Score	Market Capitalization	ROA	5-Year Stock Price Return
ESG Score	1.00	0.24*	0.16*	0.18*
Market Capitalization ($B)	0.24*	1.00	0.10*	0.20*
Return on Assets (%)	0.16*	0.10*	1.00	0.12*
5-Year Stock Price Return (%)	0.18*	0.20*	0.12*	1.00

*$p < 0.05$

(r = 0.24), ROA (r = 0.16), and five-year stock price return (r = 0.18). This suggests that companies with higher ESG scores tend to have larger market capitalizations, higher profitability, and higher stock price returns over the long term.

5.3 Regression analysis

Table 3 presents the results of the multiple regression models predicting ROA and five-year stock price return. Model 1 includes only the ESG score as the independent variable, while Model 2 controls for company size and profitability, and Model 3 includes additional controls for industry characteristics. Model 1 shows that the ESG score has a positive and significant effect on both ROA ($\beta = 0.26$, $p < 0.01$) and five-year stock price return ($\beta = 0.22$, $p < 0.01$), indicating that higher ESG scores are associated with higher financial performance.

Model 2 shows that the positive relationship between ESG scores and financial performance remains significant even after controlling for company size and profitability. In addition, company size has a significant positive effect on ROA ($\beta = 0.42$, $p < 0.01$) and five-year stock price return ($\beta = 0.29$, $p < 0.01$), while profitability has a significant positive effect only on ROA ($\beta = 0.18$, $p < 0.01$).

Table 3. Regression analysis.

Model	Independent Variables	Dependent Variables	ß (Coefficient)	p-value
1	ESG Score	ROA	0.26	< 0.01
1	ESG Score	5-Year Stock Price Return	0.22	< 0.01
2	ESG Score, Company Size, Profitability	ROA	ESG Score: 0.21; Company Size: 0.42; Profitability: 0.18	ESG Score: < 0.01; Company Size: < 0.01; Profitability: < 0.01
2	ESG Score, Company Size, Profitability	5-Year Stock Price Return	ESG Score: 0.20; Company Size: 0.29; Profitability: N/A	ESG Score: < 0.01; Company Size: < 0.01
3	ESG Score, Company Size, Profitability, Industry Characteristics	ROA	ESG Score: 0.16; Company Size: 0.38; Profitability: 0.11; Industry Characteristics: Varies by industry	ESG Score: < 0.01; Company Size: < 0.01; Profitability: < 0.01; Industry Characteristics: Varies
3	ESG Score, Company Size, Profitability, Industry Characteristics	5-Year Stock Price Return	ESG Score: 0.16; Company Size: 0.29; Profitability: N/A; Industry Characteristics: Varies by industry	ESG Score: < 0.01; Company Size: < 0.01; -; Industry Characteristics: Varies

Model 3 shows that the positive relationship between ESG scores and financial performance remains significant even after controlling for industry characteristics. In addition, industry characteristics have a significant effect on financial performance. For example, the technology industry has a significant positive effect.

6. Discussion

The results of this study indicate a significant positive relationship between ESG factors and both stock prices and investment performance. Companies with stronger ESG performance have been found to have higher financial performance and better investment returns compared to those with weaker ESG performance. This finding is consistent with previous research [52,53] indicating that companies with better ESG practices tend to have better financial performance.

The positive relationship between ESG factors and financial performance can be attributed to several reasons. First, companies that prioritize ESG practices tend to have a better reputation and a more positive brand image, which can lead to increased customer loyalty and trust. Second, companies that adopt ESG practices are more likely to attract socially responsible investors, who value sustainability and corporate social responsibility in their investment decisions. Third, companies that prioritize ESG practices are more likely to identify and mitigate potential risks and opportunities, leading to better financial performance over the long term.

The finding that the positive relationship between ESG factors and financial performance remains significant even after controlling for company size, profitability, and industry characteristics suggests that ESG factors are important considerations for investors regardless of the company's size or profitability, or the industry in which it operates. Moreover, the finding that industry characteristics have a significant effect on financial performance suggests that the impact of ESG factors on financial performance varies across industries.

The study on the impact of Environmental, Social, and Governance (ESG) factors on stock prices and investment performance found a positive relationship between strong ESG performance and higher stock prices as well as better investment performance. This discussion aims to provide a detailed explanation of the reasons behind these results and their implications for investors.

One possible explanation for the positive relationship between ESG performance and stock prices is that companies that prioritize ESG factors tend to have a stronger long-term focus and are better positioned to manage risks and opportunities associated with environmental, social, and governance issues. For example, companies with strong environmental policies may be better equipped to navigate regulatory changes and reputational risks associated with climate change, while companies with strong governance practices may be less likely to engage in fraudulent activities or experience management turmoil.

Another possible explanation for the positive relationship between ESG performance and investment performance is that ESG factors are becoming increasingly important for investors, who are seeking to align their investments with their values and support companies with strong sustainability practices. As a result, companies that prioritize ESG factors may be more attractive to investors and may benefit from increased demand for their shares, resulting in higher stock prices.

The implications of these findings for investors are significant. The study suggests that investors who prioritize ESG factors in their investment decision-making may be able to achieve higher investment returns while also promoting sustainable corporate behavior. However, it is important to note that the impact of ESG factors on stock prices and investment performance may vary across different industries and regions, and investors should consider a range of factors when making investment decisions.

One study by Friede, Busch, and Bassen [54] found a positive relationship between ESG performance

and financial performance in the majority of studies reviewed. The present study is consistent with this finding, as it also found a positive relationship between ESG performance and both stock prices and investment performance.

Another study by Hoepner et al. [55] found that companies with strong ESG performance tended to have higher market valuations, but did not find a significant relationship between ESG performance and financial performance. In contrast, the present study found a positive relationship between ESG performance and investment performance, which suggests that ESG factors may have a more direct impact on financial outcomes than on market valuations.

A study by Clark and Feiner [56] found that companies with strong ESG performance tended to outperform their peers on a risk-adjusted basis, but did not find a significant relationship between ESG performance and stock prices. The present study is consistent with the finding that ESG performance is associated with better risk-adjusted returns, but it also found a positive relationship between ESG performance and stock prices, which suggests that the market may be increasingly valuing companies with strong sustainability practices.

Overall, the results of this study have important implications for investors, policymakers, and companies. Investors can use ESG performance as a factor in their investment decision-making process to identify companies with better financial performance and long-term sustainability. Policymakers can encourage companies to adopt ESG practices through regulation and incentives, which can lead to improved financial performance and increased investor interest. Companies can also benefit from adopting ESG practices as they can lead to improved financial performance and increased investor interest, while also contributing to social and environmental well-being.

However, this study has several limitations that should be acknowledged. Firstly, the study is based on secondary data, which may not capture all relevant variables that may affect the relationship between ESG factors and financial performance. Secondly, the study uses a cross-sectional design, which cannot establish causality between ESG factors and financial performance. Future research could use longitudinal designs and primary data to establish causal relationships between ESG factors and financial performance. Finally, the study only examines the relationship between ESG factors and financial performance in the context of the Nifty 50 index, limiting the generalizability of the findings to other stock indices or markets.

7. Practical implication and future direction

The practical implications of this study are significant for investors, policymakers, and companies. For investors, the study suggests that ESG factors should be considered when making investment decisions. Companies with strong ESG performance may offer better investment opportunities compared to those with poor ESG performance. Policymakers can also play a role in promoting the adoption of ESG practices through regulation and incentives. Finally, companies can benefit from adopting ESG practices as they may lead to improved financial performance and increased investor interest.

Future research in this area could investigate the mechanisms by which ESG factors affect financial performance. For example, it would be interesting to explore how ESG factors impact the cost of capital or affect a company's risk profile. Furthermore, future research could explore the relationship between ESG factors and other measures of financial performance, such as market value or revenue growth. Additionally, future research could investigate the impact of ESG factors on other aspects of company performance, such as employee engagement, innovation, or customer satisfaction. Finally, future research could explore the impact of ESG factors on the performance of different types of investors, such as institutional investors, retail investors, or socially responsible investors.

8. Conclusions

In conclusion, this study examined the impact of

ESG factors on stock prices and investment performance using secondary data from various sources. The findings suggest that companies with stronger ESG performance tend to have higher stock prices and better investment performance compared to those with weak ESG performance. The positive relationship between ESG performance and financial performance remained significant even after controlling for company size, profitability, and industry characteristics.

These results have important implications for investors, policymakers, and companies. Investors can use ESG performance as a factor in their investment decision-making process, while policymakers can encourage companies to adopt ESG practices through regulation and incentives. Companies can also benefit from adopting ESG practices as they can lead to improved financial performance and increased investor interest.

However, this study has some limitations. Firstly, it relies on secondary data, which may not capture all relevant variables that could impact the relationship between ESG performance and financial performance. Secondly, the study only focuses on companies in the Nifty 50 index, which limits the generalizability of the findings to other markets and industries.

Future research could overcome these limitations by conducting primary data collection and examining the impact of ESG factors on financial performance in different markets and industries. Furthermore, the research could explore the mechanisms through which ESG factors impact financial performance, such as the role of customer loyalty and employee engagement.

In conclusion, the evidence strongly suggests that ESG factors have a significant impact on stock prices and investment performance. Companies that prioritize sustainability and ethical practices are likely to outperform their peers, while those with poor ESG scores face increasing risks and may experience negative impacts on their financial performance. As investors become more aware of the importance of ESG factors, this trend is likely to continue and even accelerate.

Author Contributions

Abhinandan Kulal: structure and data analysis;

Abhishek N: conceptualisation, discussion and conclusion;

Sahana Dinesh: literature review and drafting;

Divyashree M.S.: Discussion and data collection.

Conflict of Interest

There is no conflict of interest.

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References

[1] Bhattacharya, S., Sharma, D., 2019. Do environment, social and governance performance impact credit ratings: A study from India. International Journal of Ethics and Systems. 35(3), 466-484.

[2] Calero López, I., Rodríguez-López, B., 2020. The relevance of transversal competences in vocational education and training: A bibliometric analysis. Empirical Research in Vocational Education and Training. 12(1), 1-19.

[3] Semenova, N., Hassel, L.G., 2019. Private engagement by Nordic institutional investors on environmental, social, and governance risks in global companies. Corporate Governance: An International Review. 27(2), 144-161.

[4] Tsang, A., Frost, T., Cao, H., 2022. Environmental, social, and governance (ESG) disclosure: A literature review. The British Accounting Review. 101149.

[5] Di Vaio, A., Varriale, L., Lekakou, M., et al., 2023. SDGs disclosure: Evidence from cruise corporations' sustainability reporting. Corporate

Governance. 23(4), 845-866.
DOI: https://doi.org/10.1108/CG-04-2022-0174

[6] Atif, M., Liu, B., Nadarajah, S., 2022. The effect of corporate environmental, social and governance disclosure on cash holdings: Life-cycle perspective. Business Strategy and the Environment. 31(5), 2193-2212.

[7] Xie, J., Nozawa, W., Yagi, M., et al., 2019. Do environmental, social, and governance activities improve corporate financial performance? Business Strategy and the Environment. 28(2), 286-300.

[8] Saini, M., Singh, M., Kaur, M., et al., 2021. Analysing the tweets to examine the behavioural response of Indian citizens over the approval of national education policy 2020. International Journal of Educational Development. 82, 102356.
DOI: https://doi.org/10.1016/j.ijedudev.2021.102356

[9] Hoepner, A.G.F., 2010. Portfolio diversification and environmental, social or governance criteria: Must responsible investments really be poorly diversified. SSRN Electronic Journal. 10, 1-16.

[10] Niţescu, D.C., Cristea, M.A., 2020. Environmental, social and governance risks—new challenges for the banking business sustainability. Amfiteatru Economic. 22(55), 692-706.

[11] Bruno, C., Henisz, W.J., 2022. Environmental, Social, and Governance (ESG) Factors and Municipal Bond Yields [Internet]. SSRN. Avaliable From: https://ssrn.com/abstract=4035995

[12] Sandberg, H., Alnoor, A., Tiberius, V., 2022. Environmental, Social, and Governance Ratings and Financial Performance: Evidence from the European Food Industry [Internet]. Business Strategy and the Environment. Avaliable from: https://doi.org/10.1002/bse.3259

[13] Dogru, T., Akyildirim, E., Cepni, O., et al., 2022. The effect of environmental, social and governance risks. Annals of Tourism Research. 95, 103432.

[14] Brogi, M., Lagasio, V., 2019. Environmental, social, and governance and company profitability: Are financial intermediaries different? Corporate Social Responsibility and Environmental Management. 26(3), 576-587.

[15] Shakil, M.H., Tasnia, M., Mostafiz, M.I., 2021. Board gender diversity and environmental, social and governance performance of US banks: Moderating role of environmental, social and corporate governance controversies. International Journal of Bank Marketing. 39(4), 661-677.

[16] Ruan, L., Liu, H., 2021. Environmental, social, governance activities and firm performance: Evidence from China. Sustainability. 13(2), 767.

[17] Maji, S.G., Lohia, P., 2023. Environmental, social and governance (ESG) performance and firm performance in India. Society and Business Review. 18(1), 175-194.

[18] Khalid, F., Sun, J., Huang, G., et al., 2021. Environmental, social and governance performance of Chinese multinationals: A comparison of state-and non-state-owned enterprises. Sustainability. 13(7), 4020.

[19] Vinodkumar, N., Alarifi, G., 2022. Environmental social governance: A core value to responsible stakeholders and stock market sustainability in the Kingdom of Saudi Arabia. Journal of Sustainable Finance & Investment. 12(4), 1085-1101.

[20] Bassen, A., Kovács, A.M., 2020. Environmental, social and governance key performance indicators from a capital market perspective. Springer: Berlin.

[21] Ferrero-Ferrero, I., Fernández-Izquierdo, M.Á., Muñoz-Torres, M.J., 2016. The effect of environmental, social and governance consistency on economic results. Sustainability. 8(10), 1005.

[22] Khalil, M.A., Khalil, R., Khalil, M.K., 2022. Environmental, Social and Governance (ESG)-Augmented Investments in Innovation and Firms Value: A Fixed-Effects Panel Regression of Asian Economies [Internet]. China Finance Review International. Avaliable from: http://www.globalauthorid.com/WebPortal/ArticleView?wd=20438966E55890747A07194E0AB03B53C3789440FA14D5368F3CD9467EE0E4D1

[23] Peng, L.S., Isa, M., 2020. Environmental, social and governance (ESG) practices and performance in Shariah firms: Agency or stakeholder theory? Asian Academy of Management Journal of Accounting & Finance. 16(1).

[24] Rooh, S., Hussain, A., 2022. The behavioral factors and individual investor's trading performance in Khyber Pakhtunkhwa: The mediating role of environmental, social, and governance (ESG) performance: Herding, loss aversion, mental accounting, overconfidence, and ESG performance. City University Research Journal. 12(2).

[25] Cek, K., Eyupoglu, S., 2020. Does environmental, social and governance performance influence economic performance?. Journal of Business Economics and Management. 21(4), 1165-1184.

[26] Ferrell, O.C., 2021. Addressing socio-ecological issues in marketing: Environmental, social and governance (esg). AMS Review. 11(1-2), 140-144.

[27] Brooks, C., Oikonomou, I., 2018. The effects of environmental, social and governance disclosures and performance on firm value: A review of the literature in accounting and finance. The British Accounting Review. 50(1), 1-15.

[28] López-Cabarcos, M.Á., Santos-Rodrigues, H., Quiñoá-Piñeiro, L., et al., 2023. How to Explain Stock Returns of Utility Companies from an Environmental, Social and Corporate Governance Perspective [Internet]. Corporate Social Responsibility and Environmental Management. Available from: https://doi.org/10.1002/csr.2483

[29] Wang, S.Q., Li, Y.C., Zhang, Z.M., et al., 2014. Prevention measures and socio-economic development result in a decrease in malaria in Hainan, China. Malaria Journal. 13(1), 1-6.

[30] Pacelli, V., Pampurini, F., Quaranta, A.G., 2023. Environmental, social and governance investing: Does rating matter?. Business Strategy and the Environment. 32(1), 30-41.

[31] Setyahuni, S.W., Handayani, R.S., 2020. On the value relevance of information on environmental, social, and governance (ESG): An evidence from Indonesia. Journal of Critical Reviews. 7(12), 50-58.

[32] Weber, A.S., 2011. The role of education in knowledge economies in developing countries. Procedia-Social and Behavioral Sciences. 15, 2589-2594.
DOI: https://doi.org/10.1016/j.sbspro.2011.04.151

[33] Cagli, E.C.C., Mandaci, P.E., Taşkın, D., 2022. Environmental, social, and governance (ESG) investing and commodities: Dynamic connectedness and risk management strategies. Sustainability Accounting, Management and Policy Journal. Ahead-of-print.

[34] Linnenluecke, M.K., 2022. Environmental, social and governance (ESG) performance in the context of multinational business research. Multinational Business Review. 30(1), 1-16.

[35] Bahadori, N., Kaymak, T., Seraj, M., 2021. Environmental, social, and governance factors in emerging markets: The impact on firm performance. Business Strategy & Development. 4(4), 411-422.

[36] Duque-Grisales, E., Aguilera-Caracuel, J., 2021. Environmental, social and governance (ESG) scores and financial performance of multilatinas: Moderating effects of geographic international diversification and financial slack. Journal of Business Ethics. 168(2), 315-334.

[37] Sarajoti, P., Chatjuthamard, P., Papangkorn, S., et al., 2022. The environmental, social, and governance (ESG) investment and its implications. Corporate social responsibility in the 21st century. IntechOpen: London.

[38] Singh, G.K.G., Singh, S.K.G., 2008. Malaysian graduates' employability skills. UNITAR e-Journal. 4(1), 15-45.

[39] Alda, M., 2021. The environmental, social, and governance (ESG) dimension of firms in which social responsible investment (SRI) and conventional pension funds invest: The mainstream SRI and the ESG inclusion. Journal of Cleaner Production. 298, 126812.

[40] Capelli, P., Ielasi, F., Russo, A., 2021. Forecasting volatility by integrating financial risk with environmental, social, and governance risk. Corporate Social Responsibility and Environmental Management. 28(5), 1483-1495.

[41] Harvey, L., Bowers-Brown, T., 2004. Employability cross-country comparisons. Graduate Market Trends. 5, 3-5.

[42] Taliento, M., Favino, C., Netti, A., 2019. Impact of environmental, social, and governance information on economic performance: Evidence of a corporate 'sustainability advantage' from Europe. Sustainability. 11(6), 1738.

[43] Shaikh, I., 2022. Environmental, social, and governance (ESG) practice and firm performance: An international evidence. Journal of Business Economics and Management. 23(1), 218-237.

[44] Dreyer, J.K., Moreira, M., Smith, W.T., et al., 2023. Do environmental, social and governance practices affect portfolio returns? Evidence from the US stock market from 2002 to 2020. Review of Accounting and Finance. Ahead-of-print.

[45] Teti, E., Dell'Acqua, A., Bonsi, P., 2022. Detangling the role of environmental, social, and governance factors on M&A performance. Corporate Social Responsibility and Environmental Management. 29(5), 1768-1781.

[46] Shakil, M.H., 2021. Environmental, social and governance performance and financial risk: Moderating role of ESG controversies and board gender diversity. Resources Policy. 72, 102144.

[47] Winegarden, W., 2019. Environmental, Social, and Governance (ESG) Investing: An Evaluation of the Evidence [Internet]. Pacific Research Institute. Available from: https://www.pacificresearch.org/wp-content/uploads/2019/05/ESG_Funds_F_web.pdf

[48] Crifo, P., Forget, V.D., Teyssier, S., 2015. The price of environmental, social and governance practice disclosure: An experiment with professional private equity investors. Journal of Corporate Finance. 30, 168-194.

[49] Mulchandani, K., Mulchandani, K., Iyer, G., et al., 2022. Do equity investors care about environment, social and governance (ESG) disclosure performance? Evidence from India. Global Business Review. 23(6), 1336-1352.

[50] Feng, G.F., Long, H., Wang, H.J., et al., 2022. Environmental, social and governance, corporate social responsibility, and stock returns: What are the short- and long-run relationships? Corporate Social Responsibility and Environmental Management. 29(5), 1884-1895.

[51] La Torre, M., Mango, F., Cafaro, A., et al., 2020. Does the esg index affect stock return? evidence from the eurostoxx50. Sustainability. 12(16), 6387.

[52] Suttipun, M., Yordudom, T., 2021. Impact of environmental, social and governance disclosures on market reaction: An evidence of Top50 companies listed from Thailand. Journal of Financial Reporting and Accounting. 20(3/4), 753-767.

[53] Andini, V.P., Nursabela, M., Widarwati, E., et al., 2021. Environmental Transparency and Corporate Sustainability Performance: Preliminary Finding in Indonesian Industry During COVID-19 [Internet]. Available from: https://www.institute-csp.org/wp-content/uploads/2022/05/4.-Revised-Paper-Andini-et-al..pdf

[54] Friede, G., Busch, T., Bassen, A., 2015. ESG and financial performance: Aggregated evidence from more than 2000 empirical studies. Journal of Sustainable Finance & Investment. 5(4), 210-233.
DOI: https://doi.org/10.1080/20430795.2015.1118917

[55] Hoepner, A., Oikonomou, I., Scholtens, B., et al., 2016. The effects of corporate and country sustainability characteristics on the cost of debt: An international investigation. Journal of Business Finance & Accounting. 43(1-2), 158-190.
DOI: https://doi.org/10.1111/jbfa.12183

[56] Clark, G.L., Feiner, A., Viehs, M., 2015. From the stockholder to the stakeholder: How sustainability can drive financial outperformance. Social Science Research Network.
DOI: https://doi.org/10.2139/ssrn.2508281

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REVIEW

VIKOR Method—An Effective Compromising Ranking Technique for Decision Making

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ABSTRACT

The VIKOR (VlseKriterijumska Optimizacija I Kompromisno Resenje) method, which is a multi-criteria decision-making method, is examined in this paper. The VIKOR method, like other MCDM techniques such as the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), is widely used to solve complex decision-making problems in various fields such as engineering, management, and finance. This paper provides an overview of the VIKOR method, including its application areas, advantages, and disadvantages. Besides, in this survey paper, the process steps of the VIKOR method are described, including determining the decision matrix, normalizing the matrix, determining the weights of the criteria, calculating the utility and regret values, calculating the VIKOR index, and finally ranking the alternatives. By providing an overview of the VIKOR method and its process steps, this paper aims to provide a better understanding of the method and its potential application in different decision-making contexts.

Keywords: Decision making; Multi criteria decision making; VIKOR method; VlseKriterijumska Optimizacija I Kompromisno Resenje; Multi attribute decision making

1. Introduction

Multi-attribute decision making (MADM) methods can be used to solve most decision-making problems with contradictory and multiple evaluation standards [1]. These methods assist the managers and decision-makers with different dimensions of a problem, which allows them to evaluate all probable options and consider different elements and under variable degrees in the decision making which is a vital aspect of individuals' life [2]. There are different qualitative and quantitative MADM techniques.

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The compromise ranking method known as VIKOR "VlseKriterijumska Optimizacija I Kompromisno Resenje" is one of the main and effective MADM tools used to select an alternative among different options by considering several criteria [1]. This method works based on introducing a ranking index considering the closeness to an ideal solution using a specific measure [3-5]. Therefore, the basis of this method is similar to TOPSIS (based on distances to the ideal solution [6]), although there are some differences that will be discussed in the following sections [7-9]. Furthermore, this method does not consider bias toward a particular option, and a compromise is made between possibilities, desires, as well as the decision makers' interests. The VIKOR method seeks to identify the most suitable alternative from a range of viable options by balancing the ideal and anti-ideal solutions. This approach takes into account several criteria and aims to achieve the best possible outcome. One of the significant benefits of the VIKOR method is its capability to manage insufficient or conflicting data while accommodating both quantitative and qualitative aspects. Nevertheless, the method also has certain limitations, such as its susceptibility to fluctuations in the criteria weightings, which can impact the ranking outcomes.

This compromise solution is based on examining the narrower range of viable solutions that approach the ideal solution based on their values, for example, a reference point that is in the criteria functions' space. Usually, these criteria consider maximum profit and minimum costs (expenses), although other concepts and dimensions such as energy and services also can be included. Generally, the criteria include different qualitative and quantitative aspects such as technical and economic criteria, which can be either quantitative or qualitative. On the other hand, the criteria functions can be expressed by using different measuring units, and this difficulty to make the comparison between alternatives must be addressed in decision making [5].

To sum, the VIKOR provides a multi-criteria ranking index based on the closeness to the ideal solution and aims to determine:

- the compromise ranking list;
- the compromise solution;
- the weight stability intervals.

Here, the weight stability intervals are determined for the compromise solution's preference stability which is gained with the initial (given) weights [8].

The following sections are provided to review the VIKOR method in more detail. For this, first, the main differences between the TOPSIS and VIKOR will be described, then the application areas, advantages, and disadvantages are listed. The process steps also are explained in the last section.

2. VIKOR vs. TOPSIS

As discussed, both methods work based on the closeness of options to an ideal point. However, there are several differences between them that are summarized in **Table 1**.

Table 1. TOPSIS and VIKOR differences [9].

Features	TOPSIS	VIKOR
Normalization Method	vector normalization	linear normalization
Compromise Solution Basis	Based on a maximum "group utility" for the "majority" and a minimum of an individual regret for the "opponent".	Based on the shortest distance to the ideal solution and the greatest distance from the negative-ideal solution without considering the relative importance.
Aggregation and Ranking Index	The ranking index includes the distances from the ideal point and the nadir (negative-ideal) point. One of the main concerns is to determine the reference point and the issues related to eliminating the role of relative importance in this method.	Introduces a function for aggregation that shows the distance from the ideal solution. Here, the ranking index is "an aggregation of all criteria, the relative importance of the criteria, and a balance between total and individual satisfaction".
Solution	The best alternative in the ranking index has the highest rank, but it is not always the alternative with a minimum distance from the ideal point.	The closest alternative to the ideal solution has the highest rank.

3. Application areas of VIKOR

MADM methods are applicable in different areas. The VIKOR method also can be applied in manifold subject areas such as engineering, supply chain and health care. The distribution of the subject areas of the VIKOR method based on searching the "VIKOR" title in the "ScienceDirect" database (including the research articles with "VIKOR" title in their "title, abstract, or keywords") is shown in **Figure 1**:

To discuss the application areas more specifically, the results of a literature review by Mardani et al. [10] are summarized here. They classified the application fields into 15 different categories. The summary is shown in **Table 2**.

4. Advantages and disadvantages of VIKOR

As can be seen in other MADM methods, the VICOR also possesses different advantages and disadvantages. One of the main positive points in the VIKOR is reflecting most decision makers' attributes by determining a compromise solution [3]. The other

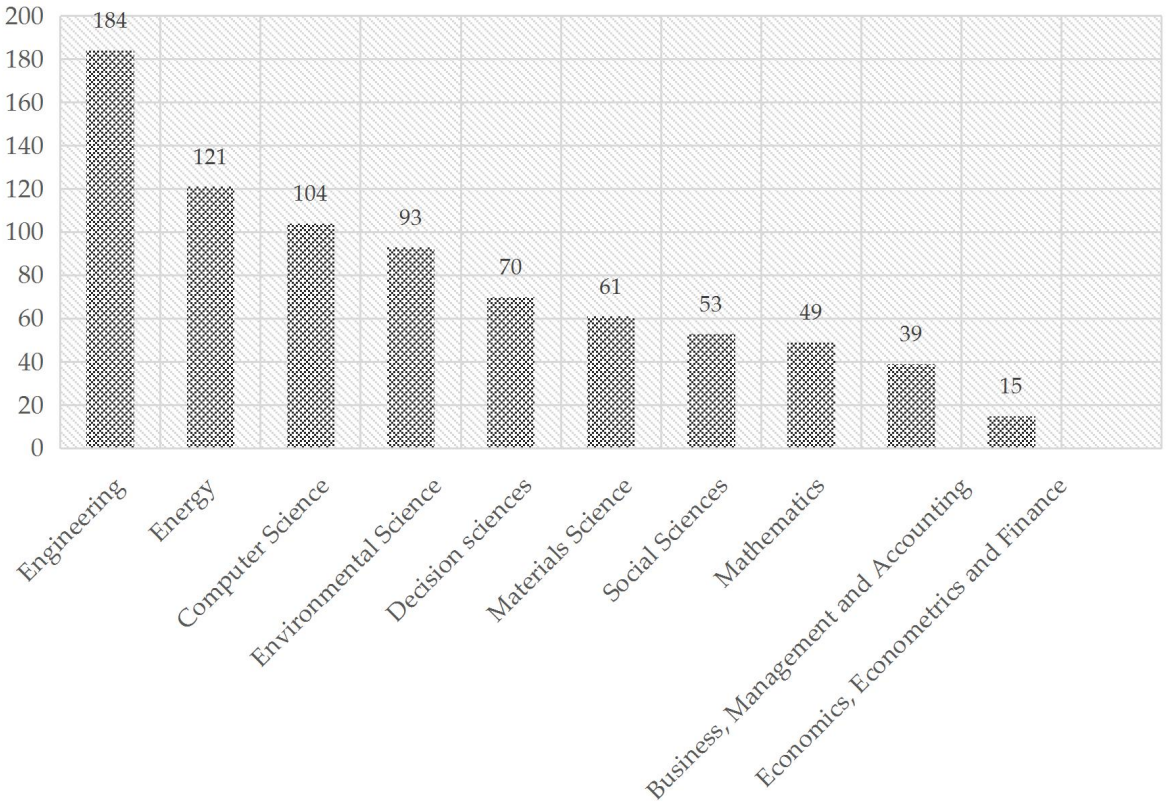

Figure 1. Distribution of the VIKOR subject areas.

Table 2. Application areas of the VICOR method.

Application Area	Description
Manufacturing	The articles in different sub-areas such as manufacturing systems, machine tools, product design, robot selection, strategies of manufacturing, and development of products.
Construction Management	This area includes project management, transportation systems, building fields, and tunneling sub-areas.
Material Selection	The articles aim to select materials for different purposes such as pipeline material, materials for transducer application, etc.
Performance Evaluation	This area includes the performance evaluation of banks, universities, businesses as well as engineering departments.

Table 2 continued

Application Area	Description
Health-Care	The studies consider the healthcare management and healthcare waste disposal fields.
Supply Chain	This field covers different sub-areas including supply chain networks, selection of suppliers, and the performance of the supply chain.
Tourism	The studies are about tourism development and its policies.
Service Quality	It includes electronic quality of services, airlines as well as service quality improvement areas.
Sustainability and Renewable Energy Fields	This area considers energy resources, environmental management and evaluation, and the assessment of life cycle sustainability.
Water Resources Planning	The subjects aim to develop, plan, manage and distribute water resources based on optimal usage.
Marketing	Marketing includes outsourcing providers, portfolio selection, brand marketing, and also strategy evaluation sub-areas.
Risk and Financial Management	The subjects aim to evaluate the risks in different processes, study information security, and also consider the financial performance improvement and financial assessment areas.
Operation Management	It is about city logistics, knowledge management, selection of concepts, process performance, and benchmarking fields.
Human Resource Management (HRM)	The sub-areas such as evaluation of HRM systems, corporate social responsibility, intellectual capital as well as customer satisfaction are considered.
Other Areas	Other areas such as the leachate treatment process, network selection, flood management, etc. are studied.

merits of the VIKOR can be listed as:

- It has a very simple ranking procedure with a small number of steps [3];
- It considers minimum individual regrets and maximum group benefits to gain an acceptable compromise solution;
- A consistency check is not required in this method [11].

On the other hand, it possesses different demerits. The main is that the VIKOR searches for the compromise ranking order, for example between expected solution and pessimistic. Therefore, changing the solutions' weights can impact the ranking as the results of the solution. Although, the noted demerit is considered an advantage by some authors. Because, changing the weights of the expected solution and pessimistic a significant factor, it could be possible to identify how the impacts on the coefficient of weights can affect the alternatives' ranking. Another disadvantage is the necessity of using a complex linear normalization method in a specific step to gain dimensionless units in the decision matrix (as other methods are not suitable). However, modifications are suggested that can make using other normalization methods possible in some situations [5,12].

To improve the traditional VIKOR concept, various variants are suggested by several authors. For example, variants such as Comprehensive VIKOR, Fuzzy VIKOR, Regret VIKOR, and a modified model have been proposed and analyzed by Chatterjee and Chakraborty [13] in order to determine the suitability of different VIKOR variations for various decision-making problems. Based on their results, Fuzzy VIKOR, for instance, is recommended when the information is imprecise.

5. VIKOR process steps

The process of conducting the VIKOR method includes different steps (shown in **Figure 2**). The variables used in the equations are defined first as:

- a_j is the alternative, j = 1,2, ..., J and J is the number of alternatives;
- f_i is the criterion i = 1,2, ..., n and n is the number of criteria;
- f_{ij} is the value of i^{th} criterion function for the

alternative a_j;

- w_i is the weights of the *i*criterion expressing the relative importance of the criteria.

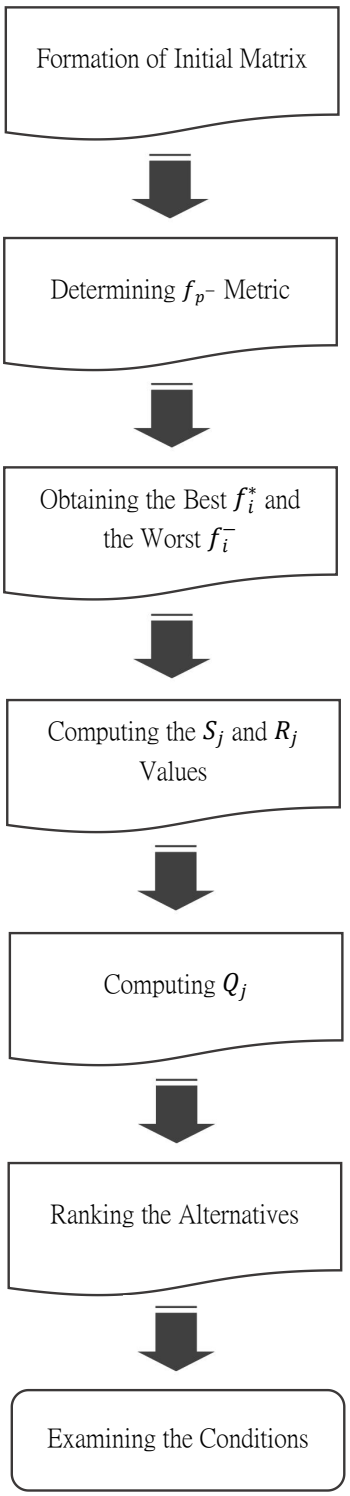

Figure 2. VIKOR process steps.

Step 1. Formation of Initial Matrix

The VIKOR process starts with providing a decision table followed by an initial decision matrix to show the alternatives, criteria, and their weights.

Step 2. Determining L_p-metric

An assumption in this method is to evaluate each alternative based on each criterion and use a compromise ranking comparing closeness to the ideal alternative. For this, L_p-metric is used as an aggregating function to develop the multi-criteria measure for compromise ranking. L_p-metric is calculated as Equation (1):

$$L_p = \left\{\sum_{i=1}^{n}\left[w_i(f_i^* - f_{ij})/(f_i^* - f_i^-)\right]^p\right\}^{1/p} \quad (1)$$

$$where\ 1 \le p \le \infty\ and\ j = 1,2,3,\ldots,J.$$

In the VIKOR process, L_{1j} and $L_{\infty j}$ (as S_j and R_j in Equations (2) and (3); respectively) are used for ranking measure formulation in the next steps. Furthermore, the solutions gained by $min_j S_j$ and $min_j R_j$ are with "a maximum group utility known as majority rule" and "a minimum individual regret of the opponent"; respectively. Ideal and compromise solutions are shown in **Figure 3**. In this figure, F^c is the compromise solution which is the closest feasible solution to the ideal solution (F^*), and compromise means an agreement based on mutual concessions. These concepts are shown in the figure and can be illustrated as:

$$\Delta f_1 = f_1^* - f_1^c\ and\ \Delta f_2 = f_2^* - f_2^c$$

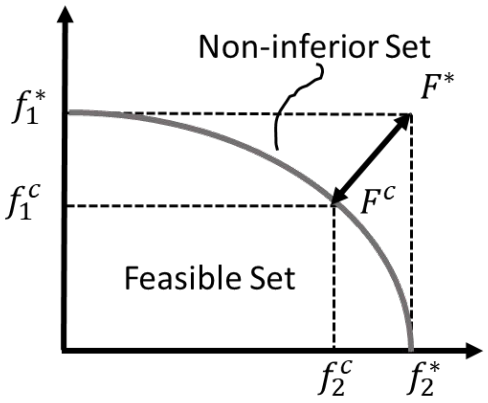

Figure 3. Ideal and compromise solutions in the VIKOR method [9].

After recognizing the compromise concept better, the VIKOR algorithm to gain the compromise ranking is described in the next following steps.

Step 3. Obtaining the Best f_i^* and the Worst f_i^-

In this step, the values of f_i^* and f_i^- for all criterion functions must be determined. For this, $f_i^* = \max_j f_{ij}$ *and* $f_i^- = \min_j f_{ij}$, when a benefit is represented by the i^{th} function.

Step 4. Computing the S_j and R_j values

Equations (2) and (3) are used to gain the values of S_j and R_j:

$$S_j = \sum_{i=1}^{n} w_i(f_i^* - f_{ij})/(f_i^* - f_i^-);\ i = 1,2, ..., n. \quad (2)$$

$$R_j = \max_i [w_i(f_i^* - f_{ij})/(f_i^* - f_i^-)];\ i = 1,2, ..., n. \quad (3)$$

Step 5. Computing Q_j

This value is obtained using the following equation:

$$Q_j = \frac{\vartheta(S_j - S^*)}{(S^- - S^*)} + (1-\vartheta)\frac{(R_j - R^*)}{(R^- - R^*)};$$
$$If:\ Q_{Sj} = \frac{(S_j - S^*)}{(S^- - S^*)}\ and\ Q_{Rj} = \frac{(R_j - R^*)}{(R^- - R^*)} \quad (4)$$

Then:

$$Q_j = \vartheta Q_{Sj} + (1-\vartheta)Q_{Rj}; \quad (5)$$

In Equation (4):

$$S^* = \min_j S_j;\ S^- = \max_j S_j;\ R^* = \min_j R_j;\ R^- = \max_j R_j.$$

In Equation (4), ϑ is "the weight of satisfying most criteria" based on the weight of the strategy of "the majority of criteria" or "the maximum group utility". On the other hand, $(1 - \vartheta)$ is "the weight of the individual loss of opportunity".

In the above equation, three ranking lists are formed as follows:

- Q_{sj} is "the measure of deviation which expresses the demand for maximum group benefit".
- Q_{Rj} is "the measure of deviation which expresses the demand for minimization of maximum distance between some alternative from the ideal point".
- Q_j is "the establishing of compromise ranking list which unifies units Q_{sj} and Q_{Rj}".

Step 6. Ranking the Alternatives

The results of this step are three ranking lists (as discussed in the previous step). The alternatives should be ranked based on the values of Q_{sj} , Q_{Rj}, and Q_j in decreasing order. For example, a_j is better than a_t, if $Q_j < Q_t$.

Step 7. Examining the Conditions

After ranking the alternatives, the last step to gain the compromise solution is to examine whether the selected alternative *a*' (with minimum *Q*) fulfills the following conditions or not:

- Condition 1: The first condition known as "acceptable advantage" examines the following condition:

$$Q(a'') - Q(a') \geq 1/(J-1) \quad (6)$$

where *a*" is the second alternative in the list of ranking.

- Condition 2: The second condition is "the acceptable stability in decision making" and can be satisfied when the alternative *a*' (ranked first in the *Q*) is also the first in the *S* or/and *R* ranking lists.

When one of the above conditions are not satisfied the following decisions are made to find a set of compromise solutions:

- If just condition 1 is satisfied, then *a*' and *a*" are in the final compromise solution set.
- If just condition 2 is satisfied, then *a*', *a*", …, $a^{(h)}$ is the alternative set. *h* is a position number in the ranking list when the condition $Q(a^{(h)}) - Q(a) < 1/(J-1)$ is verified using $a^{(h)}$ [3,5,7,9].

6. Conclusions

In conclusion, the VIKOR MADM method is a useful tool for decision-making in various application areas, ranging from supply chain management to healthcare and water resources planning. The main advantages of VIKOR include its ability to provide a compromise solution that takes into account multiple criteria and its ability to rank alternatives based on their distance from the ideal solution. However, VIKOR also has some disadvantages, such as its sensitivity to the weight coefficients assigned to the criteria and its lack of flexibility in dealing with uncertain and imprecise information.

The comparison between VIKOR and TOPSIS revealed some important differences between the two methods. While both methods aim to provide a

compromise, solution based on multiple criteria, they differ in terms of their normalization methods, the basis of their compromise solution, aggregation, and ranking index. Specifically, VIKOR uses a ranking index based on the concept of "closeness to the ideal solution", whereas TOPSIS uses a ranking index based on the concept of "closeness to the average solution" [6].

Overall, the VIKOR MADM method can be a valuable tool for decision-makers who need to evaluate alternatives based on multiple criteria. The process steps involved in using VIKOR, including defining the decision problem, selecting the criteria and alternatives, normalizing the criteria values, calculating the VIKOR scores, and ranking the alternatives, are straightforward and can be easily implemented using various software tools.

Conflict of Interest

There is no conflict of interest.

References

[1] Taherdoost, H., Madanchian, M., 2023. Multi-Criteria Decision Making (MCDM) methods and concepts. Encyclopedia. 3(1), 77-87.

[2] Taherdoost, H., Madanchian, M., 2020. Prioritization of leadership effectiveness dimensions improving organizational performance via analytical hierarchy process (AHP) technique: A case study for malaysia's digital service SMEs. Digital Transformation and Innovative Services for Business and Learning. IGI Global. 1-21.

[3] Wei, J., Lin, X. (editors), 2008. The multiple attribute decision-making VIKOR method and its application. 2008 4th International Conference on Wireless Communications, Networking and Mobile Computing; 2008 Oct 12-14; Dalian. New York: IEEE. p. 1-4.

[4] San Cristóbal, J.R., 2011. Multi-criteria decision-making in the selection of a renewable energy project in spain: The Vikor method. Renewable Energy. 36(2), 498-502.

[5] Zimonjić, S., Đekić, M., Kastratović, E., 2018. Application of vikor method in ranking the investment projects. Journal of International Economic Law. 8, 125-134.

[6] Jalaliyoon, N., Taherdoost, H., Zamani, M., 2010. Utilizing the BSC and EFQM as a combination framework; Scrutinizing the possibility by TOPSIS method. International Journal of Business Research and Management. 1(3), 169-182.

[7] Ceballos, B., Lamata, M.T., Pelta, D.A., 2016. A comparative analysis of multi-criteria decision-making methods. Progress in Artificial Intelligence. 5(4), 315-322.

[8] Opricovic, S., 1998. Multicriteria optimization of civil engineering systems. Faculty of Civil Engineering, Belgrade. 2(1), 5-21.

[9] Opricovic, S., Tzeng, G.H., 2004. Compromise solution by MCDM methods: A comparative analysis of VIKOR and TOPSIS. European Journal of Operational Research. 156(2), 445-455.

[10] Mardani, A., Zavadskas, E.K., Govindan, K., et al., 2016. VIKOR technique: A systematic review of the state of the art literature on methodologies and applications. Sustainability. 8(1), 37.

[11] Zheng, G., Wang, X., 2020. The comprehensive evaluation of renewable energy system schemes in tourist resorts based on VIKOR method. Energy. 193, 116676.

[12] Mančev, M., 2013. Service quality management in the libraries at the University of Niš Faculties using the VIKOR method. Journal INFO Theca. 14(1), 15-25.

[13] Chatterjee, P., Chakraborty, S., 2016. A comparative analysis of VIKOR method and its variants. Decision Science Letters. 5(4), 469-486.

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ARTICLE

Factors Affecting the Entrepreneurial Intention of Students at Tan Trao University

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ABSTRACT

Entrepreneurship is one of the popular choices for students after graduation from higher education. The study focuses on proposing a model to identify the factors affecting the entrepreneurial intention of students at Tan Trao University by researching some typical models in the world. By quantitative research methods based on a survey of 391 students, the study has shown that there are 5 factors affecting the entrepreneurial intention of students at Tan Trao University, including opportunity, motivation, perception of behavioral control, skills and resources for entrepreneurship. Thereby, the study proposes a number of solutions for the students, the university and other related parties to promote students' entrepreneurial intentions.

Keywords: Factors; Entrepreneurial intention; Students; Tan Trao University

1. Introduction

Few could argue that entrepreneurship plays an important role in innovation, economic development and solving social problems, especially creating jobs for the workforce. This is the general trend of the world today. According to statistics from the Ministry of Planning and Investment of Vietnam, by the end of 2020, the contribution rate of small, medium and micro enterprises to the total national budget revenue was as high as 31%, accounting for 40% of GDP [1]. These enterprises also created more than 5.5 million jobs for society in the period of 2016-2020 [2]. Based on the report of the General Department of Population and Family Planning, since 2020, un-

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employment has increased and people's income has decreased, which is an urgent issue for the Vietnamese economy. In 2022, Vietnam's unemployment is 2.21% [3]. In fact, the process of enterprises recruitment and job finding in the country has been facing many difficulties. Besides, the supply and demand in the labor market may be seriously imbalanced between different economic sectors. When hundreds of students have no work or have a work out of their training major after graduation, entrepreneurship is one of the best solutions for those who want to find and build their careers. Moreover, in Vietnam, small and medium-sized enterprises are the majority and main type of enterprises in the economy. In 2020, SMEs is accounting for more than 97% of the total number of enterprises in the country, employing up to 36.3% of social workers [3]. Most of these enterprises are established by entrepreneurial activities.

"Entrepreneurship" is a term that researchers have defined in different ways at different times. Schumpeter (1934) defined entrepreneurship as the realization of new combinations of businesses—new products, new services, new sources of raw materials, new production methods, new markets, and new forms of organization [4]. Cole (1959) defined entrepreneurship as a purposeful activity to start and develop a business with the goal of making a profit. According to Gartner (1985), entrepreneurship is the creation of new businesses [5]. Approaching from the perspective of social responsibility, entrepreneurship is a process of innovation and making a difference to bring wealth to individuals and create new values for society. This understanding reflects the social function of business, which is to benefit the community instead of pursuing self-interest [6]. Entrepreneurship is not only an individual entrepreneur's choice to be his own boss, to pursue his own ideas and to bring financial benefits to themselves, but it also plays an important role in economic development, in solving national and global problems.

In recent years, researching entrepreneurship has attracted the attention of many domestic and international experts and researchers. It is recognized that training and education in entrepreneurship have contributed to the stability of regional economic development [7]. Thanks to the focus on education, today, an increasing number of students from universities are inclined to get into entrepreneurship. Therefore, educators and policy makers have been making efforts to encourage entrepreneurship in society.

Today, in Vietnam, there is a fact that after graduation, most students prefer stable jobs rather than exploring and challenging business and startup opportunities. The awareness of entrepreneurship and the spirit of entrepreneurship is relatively low. According to a report in the Business Forum in 2017, the result of a survey showed that up to 66.6% of Vietnamese students have not yet known about entrepreneurship. The number of students who have some information about entrepreneurship is only 33.4%, and the number of students who actually participate in startup activities initiated by VCCI is only 0.016%. 62% of students surveyed think that entrepreneurship is just a movement and not really effective. Therefore, motivating and promoting students to participate in entrepreneurship is extremely important [8].

Intention for entrepreneurship is the early stage of the entrepreneurial process, in which it is easily affected by several factors. According to Armitage (2011), intention predicts about 50% of actual behavior [9]. Therefore, analyzing the factors affecting entrepreneurial intention is considered an effective measure to improve the quantity and quality of students' entrepreneurial spirit. Detecting and measuring factors affecting students' entrepreneurial intentions will provide a scientific basis for proposing effective policies in creating an entrepreneurial environment that promotes their entrepreneurial intention at Tan Trao University.

2. Literature review

Research on entrepreneurship has been carried out by many researchers around the world on different views.

The study "Entrepreneurship as a Career Choice: An Analysis of Entrepreneurial Self-Efficacy and Intention of University Students" by Akmaliah (2009), was conducted to determine the perception of en-

trepreneurial effectiveness and the entrepreneurial intention of university students. The study used a descriptive study design with 1,554 undergraduate students participating in the survey. Each set of study constructs has a range of confidence values between 0.74 and 0.96. The results indicated that the students had average scores across all constructs related to entrepreneurial intention and entrepreneurial performance in management, finance and marketing aspects. Furthermore, students with positive entrepreneurial aspirations scored higher on entrepreneurial intentions and self-efficacy, significantly different from students without positive aspirations. The students also scored average on attitudes to business careers and cognitive behavioral control. The findings also showed that those who were aware of the need for entrepreneurship to go to college had significantly higher average scores on attitudes toward entrepreneurship as well as perceived behavioral control [10].

"Exploring entrepreneurial readiness of youth and startup success components: Entrepreneurship training as a moderator" by Seun Azeez Olugbola (2016) has pointed out the positive effects of identifying opportunities, motivations and resources on entrepreneurship. The research emphasized the central role of entrepreneurship training in all factors, including entrepreneurial possibility. This study analyzed youth's entrepreneurship readiness in terms of identifying opportunities, motivational factors, resources and entrepreneurial ability. The study also examined the impact of entrepreneurship training on young people's readiness to start a business and the components behind successful entrepreneurship. SEM model was applied to a sample of 490 students from the University of Sains Islam in Malaysia [11].

Chang Hui-Chen and his colleagues (2014) studied the entrepreneurial process of a person by integrating the theory of planned behavior (TPB) with the theory of motivation-opportunity-ability (MOA). The model assumes that motivation, opportunity, and ability influence entrepreneurial intention through individual attitudes, subjective norms, and perceived behavioral control. The authors collected a sample of 258 valid questionnaires from participants in a start-up training course in Taiwan. Firstly, personal attitude and perceived behavioral control have a direct influence on entrepreneurial intention. Secondly, both subjective norms and motivation indirectly influence entrepreneurial intention through individual attitudes and cognitive behavioral control. Thirdly, the ability has a direct positive association with entrepreneurship intention and an indirect influence on entrepreneurship intention through cognitive behavioral control [12].

Izaias Martins et al. developed and examined an aspect of the impact of entrepreneurship education programs on individual entrepreneurial orientation (IEOs) and the role of IEOs as precursors of attitude and entrepreneurial intention (EI) through aspects of the Theory of Planned Behavior (TPB). This study used pre-test analysis with data by looking at 1,723 university students in Colombia and Ecuador. Wilcoxon's signature test and rating test confirmed the impact of entrepreneurship education programs on IEOs. Furthermore, structural equation modeling was used to confirm the theoretical model and test hypotheses between IEO, TPB and EI [13].

Currently in Vietnam, entrepreneurship is also a path that many students choose after graduating from universities. Therefore, many researchers have paid great attention to entrepreneurship.

"Intentions, motivations and desire to participate in entrepreneurship of youth today", by Nguyen Tuan Anh (2019) conducted a survey on 1,500 young people currently living, studying and working in 7 provinces/cities across the country to give an overview of their entrepreneurial intentions, motivations and desires. The survey results showed that the majority of young people surveyed had or are planning to implement an entrepreneurial activity with the greatest motivation to develop their own careers. They hope to be supported in terms of capital, knowledge, technology, market... in order to well implement their entrepreneurial projects [14].

"Factors affecting students' entrepreneurial intention" by Truong Duc Thao, Nguyen Trung Thuy Linh (2019) is based on the synthesis of domestic and foreign research on entrepreneurial intentions

of students and factors affecting their entrepreneurial intention. The authors have argued and pointed out the relationship of 6 factors affecting students' entrepreneurial intention including self-expectation, Attitudes towards entrepreneurship; Self-perceived capacity; Belief standards; Knowledge capital; Financial capital [15].

The research paper named "Factors affecting the entrepreneurial intention of students at Thai Nguyen University of Economics and Business Administration" by Vu Quynh Nam (2020) is conducted through a survey of 250 university students in Thai Nguyen Economics and Business Administration (TUEBA). To analyze the factors affecting students' entrepreneurial intention, the study used exploratory factor analysis (EFA) and regression analysis methods. Research results have confirmed that 66.8% of TUEBA students' entrepreneurial intention is influenced by the following factors: Their own expectations; Attitudes towards entrepreneurship; Self-perceived capacity; Belief standards; Knowledge capital; and Financial capital [16].

Dang Kim Thoa et al. researched the topic "Quality of entrepreneurial training in universities". The study showed that training quality plays an important role in creating successful entrepreneurial intention for students; thereby pointing out measures to improve the quality of training in universities in order to create successful entrepreneurs [17].

Vo Van Hien et al. conducted "Research on factors affecting entrepreneurial intention of students of Tien Giang University" to identify the factors affecting entrepreneurial intention of students of Tien Giang University based on Ajzen's theory of intended behavior. After combining it with related studies, the authors built a proposed research model including seven factors affecting entrepreneurial intention. Research results show that there are five factors affecting students' entrepreneurial intention, arranged in descending order of influence: (1) personality characteristics, (2) education of entrepreneurship, (3) experience, (4) perceived behavioral control, and (5) subjective norms. Based on the research results, some managerial implications related to the 5 influencing factors are also given in order to improve the entrepreneurial intention of university students, and at the same time suggest research directions for the future [18].

3. Methodology of the research

According to the literature review above and previous models of entrepreneurial intention, including:

(1) The research model proposed by Seun Azeez Olugbola: It refers to the factors affecting the entrepreneurial readiness, including motivation, opportunities, resources, abilities and entrepreneurial training, in which, the entrepreneurial training factor dominates the impact of motivational factors, opportunities, and resources on the entrepreneurial intention [11].

(2) The research model proposed in the study of Chang Hui-Chen et al.: It was developed by integrating the theory of planned behavior with the theory of motivation-opportunity-ability [12].

In order to build a suitable model for this study, on the basis of an overview of the theories related to entrepreneurship and students' entrepreneurship, the authors propose a model for analysis of the influencing factors on entrepreneurial intention of students at Tan Trao University. **Figure 1** below shows the model of 7 factors, including:

(1) Motivation;

(2) Opportunity;

(3) Ability and skills;

(4) Resources;

(5) Perception of the usefulness of the field of entrepreneurial intention;

(6) Perceived behavioral control;

(7) Training program in the university.

Hypotheses of the study

H1: Motivation has a positive influence on students' entrepreneurial intention.

H2: Opportunities affect positively students' entrepreneurial intention.

H3: Entrepreneurial skills have a positive effect on students' entrepreneurial intentions.

H4: Resources influence positively students' entrepreneurial intention.

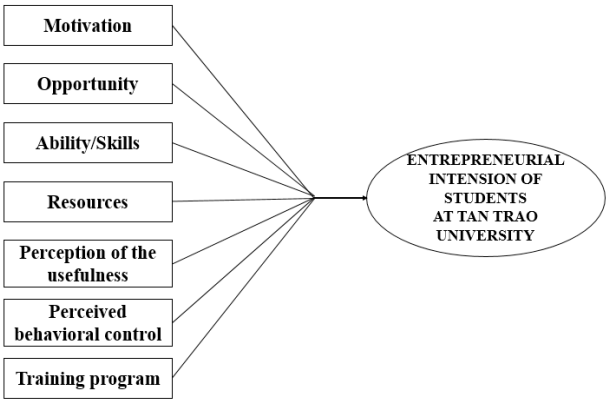

Figure 1. Proposed research model of the study.

H5: The university's training program has the same effect and is in the direction of promoting students' entrepreneurial intentions.

H6: Students' perception of the usefulness of the field in that they intend to start entrepreneurship has a positive influence on their entrepreneurial intention.

H7: Perception of behavioral control affects positively students' entrepreneurial intention.

Samples of the survey

The determination of sample size will be divided into two cases: Population unknown and population known [19]. According to the statistics reported by the Department of Student Management, as of February 2023, the number of students at Tan Trao University is 1,834 students. To determine the sample size, use the formula:

$$n = \frac{N}{1 + N * e^2}$$

in which:

•n: Sample size to be determined.

•N: Overall size.

•e: Allowable error. Usually, the three commonly used error rates are ± 01 (1%), ± 0.05 (5%), ± 0.1 (10%), of which the most common is ± 0.05.

Thus, the minimum required sample size of the study if the error e = ± 0.05 will be 328 students. To reach this size, the authors submitted an online survey through google forms. The invitation was sent to respondents via Zalo and email. As a result, the research has obtained 397 responses, with 391 samples that are eligible for quantitative analysis. The category of 6 samples did not meet the standard because the respondents did not have an objective assessment of the problem (answers were rated at the same level for all questions).

Designing the questionnaire

After reviewing domestic and foreign documents on the influence of factors on students' entrepreneurial intention, the study proposed 7 hypotheses. To test these hypotheses, a questionnaire was constructed to collect information and test hypotheses. The research uses the Likert scale in the questionnaire, because it is a commonly used scale [20].

The questionnaire consists of 2 parts: (1) Introduction and contact information of the authors; (2) Collecting personal information of the respondents and implementation, a survey of factors affecting students' entrepreneurial intention through 8 groups of questions. The questions are rated on a 5-point Likert scale (1 = "Strongly disagree", 2 = "Disagree", 3 = "Normal", 4 = "Agree", 5 = "Strongly agree") to measure factors. The groups of questions are included to use for quantitative analysis in the research.

Data processing methods

Using quantitative research methods to analyze data collected from the survey and evaluate the influence of factors on the entrepreneurial intention of students at Tan Trao University. Specifically, the study uses statistical analysis software SPSS. The reliability of variable groups was tested by Cronbach's Alpha. Then, exploratory factor analysis (EFA) was applied to determine the factors affecting the entrepreneurial intention of students at Tan Trao University. The research also filtered and rearranged the variables into groups of factors based on the result of the rotation factor matrix table. After that, the study implemented a regression of the importance of groups of variables to the model. Regression results serve as a basis for proposing recommendations to students to promote entrepreneurial spirit and intention. Moreover, some solutions were proposed for Tan Trao University to equip students with entrepreneurial

knowledge and skills in the training programs.

4. Results and discussion

As mentioned above, the survey sample of the study was implemented through an online survey and collected 391 eligible responses. **Table 1** below shows the summary of the sample.

Table 1. Summary of the survey sample.

Criteria		**Number**	**Percentage (%)**
Gender	Male	130	33.25
	Female	258	65.98
	Others	3	0.77
Year	Freshman	89	22.76
	2nd-year	164	41.94
	3rd-year	81	20.72
	final year	53	13.55
	Others	4	1.03
Major	Economics	44	11.25
	Accounting	69	17.76
	Pedagogy	86	22.00
	Information Technology	46	11.76
	Culture-Tourism	28	7.16
	Agriculture-Forestry-Fishery	17	4.35
	Medicine-Pharmacy	88	22.51
	Others	8	2.04

The research model of the study includes a dependent variable, which is Tan Trao University student's entrepreneurial intention and 7 independent variables as in **Table 2** below.

The analysis results show that all scales meet the requirements of Cronbach's Alpha reliability coefficient. Specifically, in order from high to low, the Cronbach's Alpha reliability coefficient of the observed variables is as follows:

Firstly, the highest Cronbach's Alpha coefficient is 0.882 for the variable "motivation". Secondly, the Cronbach's Alpha reliability coefficient of the entrepreneurial intention variable is 0.865. Thirdly, the Cronbach's Alpha reliability coefficient of the variable "skills" is 0.842. Fourthly, the Cronbach's Alpha reliability coefficient of the variable "opportunity" is 0.822. Fifthly, the Cronbach's Alpha reliability coefficient of the resources is 0.756. Sixthly, the Cronbach's Alpha reliability coefficient of the training program is 0.73. Seventhly, the Cronbach's Alpha reliability coefficient of the variable "perception of usefulness" is 0.653. Finally, the Cronbach's Alpha reliability coefficient of the variable "perception of behavioral control" is the lowest reaching 0.649.

Table 2. Description of the variables.

Independent Variables	
DC1, DC2, DC3, DC4	Motivation influences students' entrepreneurial intention
CH1, CH2, CH3, CH4, CH5, CH6	Entrepreneurial opportunities affect on students' entrepreneurial intention
KN1, KN2, KN3, KN4, KN5, KN6	Entrepreneurial skills influence students' entrepreneurial intention
NL1, NL2, NL3, NL4	Resources influence students' entrepreneurial intention
HI1, HI2, HI3	Perception of the usefulness affects on students' entrepreneurial intention
HV1, HV2, HV3, HV4	Perception of behavioral control has effect on students' entrepreneurial intention
CT1, CT2, CT3, CT4	Training program influences students' entrepreneurial intention
Dependent Variable	
YD1, YD2, YD3, YD4, YD5	Entrepreneurial intention of Tan Trao university students

EFA factor analysis of the independent variables

Table 3 shows that KMO coefficient = 0.803 required duration 0.5 < KMO < 1 and Bartlett's test has Sig. = 0.000 < 0.05 shows that the EFA exploratory factor analysis is consistent with the actual data collected.

At Eigenvalues = 1,130 ≥ 1 satisfactory, the extracted variance is 66.606%, which means that there is a 66.606% change in the entrepreneurial intention of Tan Trao University students explained by the observed variables.

Table 3. KMO and Bartlett's Test of the independent variables.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.803
Bartlett's Test ofSphericity	Approx. Chi-Square	2015.778
	df	325
	Sig.	0.000

EFA factor analysis of the dependent variable

In **Table 4**, the coefficient KMO = 0.836 satisfies the requirements of 0.5 < KMO < 1 and the Bartlett test has Sig.= 0.000 (< 0.05) showing that the EFA exploratory factor analysis is appropriate with the actual data obtained.

At Eigenvalues= 3,312 ≥ 1, the quoted variance is 66.241% > 50%, and the citation factor is 1, satisfying the requirements of the model.

With the data in **Table 5** below, we can see that the adjusted R-squared is 0.698, that is, 69.8% of the change in the entrepreneurial intention is explained by the variation of the independent variables in the model. The level of contribution and importance of the independent variables to the model will also be discussed and given solutions in the following section.

The variance exaggeration factors VIF of the groups of factors are all less than 2,000. Therefore, the independent variables are not correlated with each other, there is no multicollinearity between the independent variables. In order for the groups of factors to meet the conditions, it is necessary to have a Sig. coefficient, < 0.05, so after running the regression analysis, the research team found that the variables HI and CT need to be eliminated because of Sig. > 0.05. Of course, the 5 remaining variables all have Sig. < 0.05, so the model still has practical statistical significance.

Hypothesis H1: Factors of motivation have a positive influence on students' entrepreneurial intention. Normalized regression coefficient beta = 0.149, Sig. = 0.034 < 0.05. Hypothesis H1 supports the study up to 99%. The motivation for entrepreneurship is the fourth strongest factor affecting the entrepreneurial intention. This study supported previous researches that students who were more motivated were more likely to be entrepreneurial. Students with higher motivation had stronger intentions to start a business. This result is similar to some previous studies [11,14].

Hypothesis H2: Opportunities affect positively students' entrepreneurial intention. Standardized regression coefficient ß = 0.314, Sig. = 0.001 < 0.05. Hypothesis H2 supports the study up to 99%. The factor "opportunity" has the strongest impact on the entrepreneurial intention of students at Tan Trao University. This shows that the students understand that recognizing, taking advantage of and seizing opportunities around them plays an important role in forming entrepreneurial intentions and ideas. This result is similar to some previous studies [11].

Hypothesis H3: Entrepreneurial skills have a positive effect on students' entrepreneurial intention. Standardized regression coefficient ß = 0,183, Sig. = 0.008 < 0.05. Hypothesis H3 supports the study up to 99%. The factor of entrepreneurship skills is statistically significant in the regression model and has the third strongest impact on the entrepreneurial intention of students at Tan Trao University. This suggests that students' entrepreneurial intention may be affected by their individual skills. In other words, students who are fully equipped with

Table 4. KMO và Bartlett's Test of the dependent variable.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.836
Bartlett's Test ofSphericity	Approx. Chi-Square	510.329
	df	10
	Sig.	0.000

Table 5. Regression analysis of coefficients of independent factors.

Model Summary					
Model	**R**	**R Square**	**Adjusted RSquare**	**Std. Error of theEstimate**	**Durbin-Watson**
1	0.839	0.704	0.698	0.45784	1,957

ANOVA						
Model		**Sum ofSquares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	155.210	7	22.173	105,777	0.001b
	Residual	65.191	311	0.210		
	Total	220.401	318			

Coefficients								
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**	**Collinearity Statistics**	
		B	**Std. Error**	**Beta**			**Tolerance**	**VIF**
1	(Constant)	0.268	0.126		2.134	0.034		
	DC	0.151	0.060	0.149	2.513	0.012	0.796	1.257
	CH	0.326	0.080	0.314	4.090	0.001	0.632	1.582
	KN	0.178	0.067	0.183	2.569	0.008	0.701	1.427
	NL	0.137	0.068	0.115	2.162	0.032	0.754	1.327
	HI	–0.011	0.063	–0.011	–0.174	0.862	0.734	1.363
	HV	0.278	0.063	0.271	4.429	< 0.001	0.823	1.215
	CT	0.051	0.068	0.054	0.050	0.742	0.458	1.260

knowledge and skills related to entrepreneurship will have more intentions to start a business, even though their capacity may not be too seasoned and experienced. This result is similar to some previous studies [11,13,15,16].

Hypothesis H4: Resources influence positively students' entrepreneurial intention. Standardized regression coefficient ß = 0.115, Sig. = 0.032 < 0.05. Hypothesis H4 supports the study up to 99%. The resource is a factor with the weakest impact. Students who have better financial, material or even human resources will have better conditions to form and develop entrepreneurial intention. This result is similar to some previous studies [11,15].

Hypothesis H5: The university's training program has the same effect and is in the direction of promoting students' entrepreneurial intention. Standardized regression coefficient ß = 0.054, Sig. =0.742 > 0.05. Hypothesis H5 is not accepted.

The training program variable (CT) was eliminated by the Sig. coefficient over 0.05, this group of factors has no statistical significance in the regression model. It can be seen that the training program factors have not had a clear impact on the students' intention to start an entrepreneurship. In other words, the current training program of Tan Trao University has not really had much impact on students' intention and desire to participate in an entrepreneurship.

Hypothesis H6: Students' perception of the usefulness of the field that they intend to start entrepreneurship has a positive influence on their entrepreneurial intention. Standardized regression coefficient ß = –0.011, Sig. = 0.862 > 0.05. Hypothesis H6 is not accepted.

Group of HI (Students' perception of the usefulness of the field that they intend to start entrepreneurship has a positive influence on their entrepreneurial intention) has a Sig. coefficient > 0.05, which has

no statistical significance or practical significance in the regression model. This indicates that students are not really aware of the usefulness of technology and have not taken advantage of the modernity of high technology to form business startup ideas.

Hypothesis H7: Perception of behavioral control affects positively students' entrepreneurial intention. Standardized regression coefficient ß = 0.218, Sig. = 0.000. Hypothesis H7 supports the study up to 99%. This is the factor with the second strongest impact on the entrepreneurial intention. This means that if students' perceived behavioral control increases, their intention to start a business will also increase. This result is similar to some previous studies [10,18].

Research results have shown groups of factors affecting the entrepreneurial intention of students at Tan Trao University, including opportunity, motivation, skills, perception of behavioral control and resources for entrepreneurship.

5. Conclusions and recommendations

Motivation can be described as an internal force that drives human behavior. The results of the study have shown that motivation is the factor that has the strongest impact on students' intention to start a business. Therefore, in order to promote entrepreneurial intention, the authors suggest that the university and related organizations need training programs to help create and enhance students' entrepreneurial motivation. Firstly, in the training program, in addition to professional knowledge of economics and entrepreneurship, lecturers need to have encouragement and motivation to help students approach and form their own entrepreneurial mindsets and intentions. Secondly, the curriculum needs to be regularly updated, instead of just teaching in depth about theory, the university should have many combinations of teaching through experience to help students have the opportunity to interact and learn from real entrepreneurs. Thirdly, the university actively communicates examples of starting a business, which will help stimulate students' motivation to get into entrepreneurship.

In addition to the university's activities, organizations and businesses interested in entrepreneurship should coordinate and support students for start-up projects. Students' entrepreneurial motivation comes from many factors, including the need for achievement, independence in work and profit. Motivation will be nurtured and maximized if there is an environment to help realize business ideas. And with the limitation of students, organizations and businesses should have policies to support and sponsor in terms of funding or expertise to help students' projects have the opportunity to be incubated and developed.

Perception of behavioral control is an individual's perception of the ease or difficulty of performing a particular behavior. From there, the authors make recommendations for students to promote entrepreneurial intentions. Firstly, students themselves need to understand and identify their desires and goals in starting and creating businesses. Secondly, awareness governs behavior, so students need to be self-disciplined, actively learn and seek knowledge, and should participate in competitions about entrepreneurship to gain practical access to self-construction and control. implement and develop a project, thereby gaining the necessary experience and skills. Furthermore, the point of valid behavioral control is belief, so students themselves must have faith in their intentions and desires, have faith in what they do, then have a specific plan to acquire knowledge, create and realize their ideas.

The results of the research also have proven that resources are one of the factors that really have an impact on students' entrepreneurial intention. From there, the authors suggest a number of solutions to help consolidate resources to promote students' entrepreneurial intentions. On the university's side, it should be encouraged and supported to establish and maintain clubs and organizations in the field of business, and organize extra-curricular activities and competitions about entrepreneurship, by which students can come up with ideas and implement small business projects. This gives students the opportunity to try and hone, strengthen their leadership and executive abilities as well as their skills. Giving students the opportunity to gain experience is for promoting

the human resource factor. On the State's side, there should be a policy to ensure the maintenance of capital to support young people in entrepreneurship. Because the early stage of a start-up is a high-risk stage and very few outside investors invest in it [21]. Due to that, it is necessary to establish state-owned funds to support this early stage. In addition, developing more capital mobilization channels for start-ups, especially focusing on capital mobilization through the stock market is an important solution to promote entrepreneurship. It is very necessary to develop exemption support measures, such as exempting income tax from 3-5 years from the start of entrepreneurship, then applying a low preferential tax rate than the normal tax rate for these businesses. It is these things that will become a resource to promote entrepreneurial intentions and help start-up businesses develop through incentives in terms of capital, premises, infrastructure, taxes, technology for incubators, etc.

Author Contributions

Hoang Anh Dao: Conceived and designed the analysis; Performanced the analysis; Wrote the paper. Chu Thanh Mai: Implemented the survey; Processed data by quantitative analyzing software; Proposed recommendations. Phi Tra My, Phan Huyen Linh: Collected the data of literature review; Proposed the questionnaire; Implemented the survey and summarized the report of the survey's results. Le Hai Yen: Collected the data on the essentiality of the study; Proposed the questionnaire; Implemented the survey; Proposed recommendations.

Conflict of Interest

There is no conflict of interest.

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References

[1] Long, V., 2022. Doanh nghiệp nhỏ và vừa đóng góp lớn cho nền kinh tế (Vietnamese) [SMEs make great contributions to the economy]. Lao dong Newspaper, 2022 Mar 18. Available from: https://laodong.vn/kinh-doanh/doanh-nghiep-nho-va-vua-dong-gop-lon-cho-nen-kinh-te-1024647.ldo

[2] Ministry of Planning and Investment, 2022. Sách trắng: Doanh nghiệp Việt Nam năm 2022 (Vietnamese) [The White book—Enterprises in Vietnam]. Statistical Publishing: Vietnam. p. 34-39.

[3] General Statistic Office of Vietnam, 2022. Thông cáo báo chí tình hình lao động việc làm quý IV và năm 2022 (Vietnamese) [Press release: Labor and emplyment situation in Q4 and 2022] [Internet]. Available from: https://www.gso.gov.vn/tin-tuc-thong-ke/2023/01/thong-cao-bao-chi-tinh-hinh-lao-dong-viec-lam-quy-iv-va-nam-2022/

[4] Schumpeter, J.A., 1934. The theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle. Harvard Economics Study.

[5] Entrepreneurship: Definition, Origin, Concept [Internet]. iEdunote; 2022. Available from: https://www.iedunote.com/entrepreneurship

[6] Kao, R.W., 1993. Defining entrepreneurship: Past, present and? Creativity and Innovation Management. 2(1), 69-70.
DOI: https://doi.org/10.1111/j.1467-8691.1993.tb00073.x

[7] Galvão, G.D.A., de Nadae, J., Clemente, D.H., et al., 2018. Circular economy: Overview of barriers. Procedia Cirp. 73, 79-85.
DOI: https://doi.org/10.1016/j.procir.2018.04.011

[8] Vietnam Chamber of Commerce and Industry-VCCI, 2017. Cơ chế hỗ trợ doanh nghiệp khởi nghiệp sáng tạo (Vietnamese). [Mechanism to support innovative entrepreneurial enterprises]. Research Report for Guiding the Implementation of the Law on Supporting Small and Medium Enterprises 2016.

[9] Armitage, C.J., Conner, M., 2001. Efficacy of

the theory of planned behaviour: A meta-analytic review. British Journal of Social Psychology. 40(4), 471-499.
DOI: https://doi.org/10.1348/014466601164939

[10] Pihie, Z.A.L., Akmaliah, Z., 2009. Entrepreneurship as a career choice: An analysis of entrepreneurial self-efficacy and intention of university students. European Journal of Social Sciences. 9(2), 338-349.

[11] Olugbola, S.A., 2017. Exploring entrepreneurial readiness of youth and startup success components: Entrepreneurship training as a moderator. Journal of Innovation & Knowledge. 2(3), 155-171.
DOI: https://doi.org/10.1016/j.jik.2016.12.004

[12] Hui-Chen, C., Kuen-Hung, T., Chen-Yi, P., 2014. The entrepreneurial process: An integrated model. International Entrepreneurship and Management Journal. 10, 727-745.

[13] Martins, I., Perez, J.P., Novoa, S., 2022. Developing orientation to achieve entrepreneurial intention: A pretest-post-test analysis of entrepreneurship education programs. The International Journal of Management Education. 20(2), 100593.
DOI: https://doi.org/10.1016/j.ijme.2021.100593

[14] Tuan, N.A., Ha, D.T.H., Thao, V.T.B., et al., 2019. Factors affecting entrepreneurial intentions among youths in Vietnam. Children and Youth Services Review. 99, 186-193.
DOI: https://doi.org/10.1016/j.childyouth.2019.01.039

[15] Thao, T.D., Linh, N.T.T., 2019. Một số nhân tố tác động đến ý định khởi nghiệp của sinh viên (Vietnamese) [Factors affecting students' entrepreneurial intention]. Journal of Industry and Commerce. (3), 99-104.

[16] Nam, V.Q., 2020. Các nhân tố ảnh hưởng đến ý định khởi nghiệp của sinh viên trường đại học kinh tế & quản trị kinh doanh Thái Nguyên (Vietnamese) [Factors affecting the entrepreneurial intention of students at Thai Nguyen University of Economics and Business Administration]. TNU Library. Available from: https://123docz.net/document/6925811-cac-nhan-to-anh-huong-den-y-dinh-khoi-nghiep-cua-sinh-vien-truong-dai-hoc-kinh-te-quan-tri-kinh-doanh-thai-nguyen.htm

[17] Thoa, D.T.K., Diep, N.N., 2019. Chất lượng đào tạo khởi nghiệp trong trường đại học (Vietnamese) [Quality of entrepreneurial training in universities]. VNU Library. Available from: https://123docz.net/document/6925813-chat-luong-dao-tao-khoi-nghiep-trong-truong-dai-hoc.htm

[18] Hiền, V.V., Trang, L.H.V., 2021. Nghiên cứu các nhân tố ảnh hưởng đến ý định khởi nghiệp của sinh viên Trường Đại học Tiền Giang (Vietnamese) [A study of factors affecting Tien Giang university students' entrepreneurial intention]. Ho Chi Minh City Open University Journal of Science. 16(2).
DOI: https://doi.org/10.46223/HCMCOUJS.econ.vi.16.2.578.2021

[19] Taro, Y., 1967. Statistics: An introductory analysis, 2nd Edition. Harper and Row: New York.

[20] Losby, J., Wetmore, A., 2012. Using Likert Scales in Evaluation Survey Work [Internet]. Available from: https://www.cdc.gov/dhdsp/pubs/docs/cb_february_14_2012.pdf

[21] Hung, L.T., Vy, N.T.P., Hoang, H.V., 2021. Hiệu quả học tập kết hợp ở bậc Đại học: Nghiên cứu tại trường Đại học giáo dục-Đại học Quốc gia Hà Nội (Vietnamese) [The effectiveness of blended learning activities at higher education: Experiences from VNU-University of education]. Scientific Journal of Tan Trao University. 7(23).
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ARTICLE

Profitability Level and Determinants of Tea Intercropping in Taraba State

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ABSTRACT

Intercropping involves the cultivation of more than one crop on a plot of land at a particular time. Tea intercropping with other crops can increase the profitability of farmers and the development of tea plants. The study estimated the profitability level of intercropped tea farms and determined the factors affecting the profitability of tea intercropping systems in the study area. Information was obtained from two hundred and four tea farmers using a well-structured questionnaire. The analytical techniques used in the study were descriptive analysis and linear regression. The results revealed that the majority (95.6%) of the farmers are from Kakara and Nyiwa towns. There are few (2.9%) women involved in tea farming in Taraba State. 29% of the tea farmers are young less than 30 years and old above 60 years. Fifteen percent of the farmers are single, 83.8% are married and 1.5% are divorced. About 40% of the tea farmers had no formal education, 21% have between 1-6 years of education, 19% had 7-12 years of education and 21% had greater than 12 years of education. The gross margin is ₦289,900,581.9 and the gross margin per farmer is ₦1,421,081.28. The net income is ₦2,879,055,533.3 and the net income per farmer is ₦1,411,301.63. The amount of profit tea farmers make in Taraba State is ₦1,425,001 and the profit per farmer is ₦6,985.30. Labour costs (weeding, pruning, application of insecticide, watering) and cost of materials (cutlass, file, chemical, bag and others) are significant determinants of the profit level of the tea intercropping system in Taraba State. Tea intercropping farming is profitable in Taraba State Nigeria.

Keywords: Determinants; Intercropping system; Profit; Tea

1. Introduction

Tea (*camellia sinensis*) is cultivated as a cash crop. The profitability of tea depends on whether the types of tea use cultivated for consumption have the right quality to make it acceptable to the consumers.

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As for people that cultivate tea, good quality tea is the one that provides the highest output for maximum profit with minimum cost. From the consumer point of view, good quality tea is one with correct tasting attributes the one that can buy and sell at very high prices. Tea intercropping with other crops can increase the profitability of farmers and the development of tea plants [1-3]. Moreover, it can reduce the cost of fertilizing and weeding [4].

Generally, plantations of tea are handled using monoculture cropping or intercropped with other crops (arable and biennials) and they serve as protection for tea plants. The intercropping system has been a long-time practice in tea plantations in countries abroad such as Indonesia. The obstacle in the intercropping system is the contest for scarce resources among the plants limiting production [5]. The production of tea involves a lot of activities some of which are discussed below:

1.1 Planting material

Tea plantations grown from seed produce heterogenous vegetable material because of the allogamy of the species [6]. The greatest progress has been achieved in a few years with vegetatively propagated clones. Though tea plant is well suited to other vegetative propagation methods such as layering, grafting and root cutting clone production (i.e., vegetatively propagated material from a selected plant) is carried out mainly through propagation by cuttings which is the simplest and most widespread method. The cutting consists of a leaf, a bud and a stem 3-4 cm long. The cuttings are placed in buckets of water and are then transported to the platforms, which are sprayed before planting out [7].

The cuttings are planted out with the stems straight or slightly bending towards the whole mother leaf, so that this does not touch the ground. The stem is held in the upper layer of the substrate, which is made up of subsoil. Tea seeds lose viability fairly rapidly and fresh seeds must therefore be sown immediately after they become available. Seed less than 10 cm in diameter must be rejected. The largest are immersed for one to two hours in order to eliminate the floating and semi-floating seeds. They are sown in seed boxes and after germination, the young plants are transferred into polythene bags.

1.2 Land clearance

Land covered by forest should be opened up at least two years before the tea plants are put in and one year before planting on savannah, grassland or land already under cultivation [8]. Land clearance should ensure the removal of all woody materials together with its roots to avoid the spread of root-rot.

1.3 Layout, holing and planting out

Field layout must be done with ranging poles and mark out the stand for each tea stand depending on the spacing to be used [7]. Hole-making takes place after the first rains preferably just before the tea plant are planted. The holes should be 20 cm wide for the stumps and double the width of the ball or pot for the plantlets. The depth of planting of tea should be 30 cm during the beginning of the rainy season preferably it should be done when the weather is overcast and even slightly damp, but planting should be avoided when it is raining heavily [9]. The different spacing types for tea across selected countries in Africa is as revealed in **Table 1**.

Table 1. Different spacing types across selected countries.

Country	Type of row	Spacing (cm)	Density
Malawi	Single	120/60	13888
		120/90	7692
		150/75	8888
		120/90	9259
Burundi	Single	120/80	10400
		130/75	10250
		140/70	10250
		120/60	10200
Cameroon	Single	120/60	13888
*Nigeria	Single	100/61	16393
		122/61	13437
		122/82	9996

Source: TEA The Tropical Agriculturist (CTA 1990).

*Suitable spacings by Cocoa Research Institute of Nigeria (CRIN).

1.4 Pruning

Pruning of tea plantations majorly serves two goals: Firstly, to encourage fresh development, because the tea production regularly declines quantitatively and periodically when pruning is done [10]. Secondly, to maintain the required height needed to harvest tea, the shrub needs to be cut to a certain level (cut across pruning).

1.5 Weeding

Weed control is significant to enable easy harvesting of clean produce [7]. Manual weeding with holes and only superficial disturbance of the soil to a depth of 2-3 cm. Chemical weeding starts as soon as young plants have sufficient well-established root stems. Hand weeding is costly; it is about one-fifth of the running costs. Hence, the use of herbicides is inevitable. However, the effectiveness of an herbicide depends on its active ingredient and on the way in which the product is applied.

1.6 Fertilization

Fertilizer known for nitrogen that can promote vegetative growth of plants need to be supplied as soon as the main produce from the tea bush is formed. The application of sulphate of ammonia is a recognised practise in many tea growing areas. The rate of fertilizer application should be based on the result of soil analysis. Most macronutrients that are of importance to tea are phosphorus, potassium, magnesium, sulphur, and calcium. The trace elements most important to tea are iron, manganese, boron, copper and zinc [11]. Organic manure is also used for tea. This is in the form of green fertilizer or decomposed organic matter. Organic matter restores the fertility of the field, and improves the soil structure (porosity), the layer of humus and the micro fauna.

1.7 Plucking

Plucking is the periodic harvesting by hand or mechanically of the young shoots, which appear above the plucking table [12]. These generally consist of a bud and two or three leaves. This two and a bud method is the model process in many tea-producing regions as it maintains good standards. Plucking could be fine or coarse. The fineness or coarseness of plucking depends upon the number of leaves taken and the time the plant is allowed to grow between plucking rounds. The aim of plucking is to strike a balance between yield and quality.

Tea is an important tree crop for local consumption and export. Planting tea with other crops is of great benefit to tea and tea farmers. This study therefore seeks to provide answers to the following research questions: What is the profitability of tea intercropped farms? What factors influence the profitability level of tea intercropped farms?

This study therefore assessed the profit level and its determinants in tea intercropping production in Taraba State, Nigeria, with these research objectives: Estimate the profitability level of intercropped tea farms; to determine the factors affecting the profitability level of intercropped tea farms in the study area.

2. Empirical review

In Zimbabwe, over the years tea farmers have witnessed a drastic reduction in their production. Most tea farmers have deserted tea production and ventured into her businesses. These farmers have attributed their leaving to viability problems. This study by Dube et al. [13] assessed the profitability of tea farmers in Zimbabwe and the factors influencing it. A simple random sampling procedure was used to obtain information from tea farmers using a structured questionnaire. The analytical techniques used were descriptive statistics, gross margin analysis and multiple regression. The average gross margin per hectare in the study area was $14.50. The lowest gross margin was –286.25 and the highest was 135.35. The determinants of tea farmers' profitability are access to extension, education, labour, tea yield, tea hectarage. Small holder out-grower tea farmers are averagely marginally profitable.

Furthermore, the study by Van Ho et al. [14] assessed the profit efficiency of tea production in Vietnam. Stochastic profit frontier function and pro-

pensity score matching were used for analysis. In the study area, the average profit efficiency was 74% indicating that 26% was lost as a result of inefficiency. In the study area, the average profit efficiency was 74% indicating that 26% was lost as a result of inefficiency. In the study tea farmers with big farms, good irrigation, and access to extension services would adopt safe tea practices compared to others. The study recommended that government policies should focus on improving profit efficiency and access to extension services and irrigation systems, and increasing farm size.

3. Methodology

The study area was Taraba State (**Figure 1**), for being mostly a producer of tea. A well-structured questionnaire was used to obtain information from 204 respondents. Most of the respondents in Taraba state are on the mabilla plateau.

Figure 1. Map of Mabilla Plateau, Taraba state Nigeria.

Source: www.bbc.com.

Analysis of the study was done using descriptive statistics and linear regression:

1) In Descriptive analysis means and frequencies were used.

2) Profitability analysis was used to estimate production cost, revenue, and profit generated from tea intercropping system.

The equation used is as shown below:

$$\text{Total Cost (TC)} = \text{Total Fixed Cost (TFC)} + \text{Total Variable Cost (TVC)} \quad (1)$$

$$\text{Gross Revenue (GR)} = \text{Total Output (total number of tons of tea sold)} \times \text{unit price} \quad (2)$$

$$\text{Gross Margin (GM)} = \text{GR} - \text{Total Variable Cost (TVC)} \quad (3)$$

$$\text{Net Income (NI)} = \text{GR} - \text{Total Fixed Cost (TFC)} \quad (4)$$

$$\text{Profit } (\pi) = \text{GR} - \text{Total Cost} \quad (5)$$

A linear regression model was used to analyse objective 2. The implicit model is:

$$Y_i = \beta_1 x_{i1} + \beta_2 x_{i2} + \ldots\ldots\ldots + \beta_p x_{ip} + e_i \quad (6)$$

where: Y = revenue from tea and other crops; e_i = error term; x_is are labour cost of land clearing, labour cost of planting tea and other crops, labour cost of weeding, labour cost of pruning, labour cost of application of insecticide, labour cost of fertilizer application, labour cost of watering, labour cost of harvesting tea and others, labour cost of others, cost of material (cutlass), cost of material (file), cost of material (plant material of tea seedlings), cost material of fertilizer, cost of material of chemical, cost of material of basket, cost of material of bag and cost of other materials.

4. Results and discussion

In **Table 2** as shown below, the majority (95.6%) of the farmers are from Kakara and Nyiwa towns. There are few (2.9%) women involved in tea farming in Taraba State. 29% of the tea farmers are young less than 30 years and old above 60 years. 15% of the farmers are single, 83.8% are married and 1.5% are divorced. About 40% of the tea farmers had no formal education, 21% have between 1-6 years of education, 19% had 7-12 years of education and 21% had greater than 12 years of education. Education plays a key role in how farmers adopt new technologies to boost their production [15].

About 51.5% of the farmers are members of a cooperative society. 91% of the farmers planted between 1-3 species of tea while 9% cultivated ≥ 4 species. The majority of the farmers planted tea with ≤ 2 crops while the others planted more than two crops. Twenty-five percent of the farmers cultivated between 2.1-5 hectares. The mean age of the farms was 22 ± 8 years. The age of farms could adversely affect the yield of crops cultivated on them. Farmers need to adopt new technologies and use fertiliser to boost their production. Also, the mean years of experience was 22 ± 9

years. The experience in tea business has a great role to play in tea production as farmers know the 'in and out' of tea production and this could also limit them in adopting new technologies [16].

Table 2. Socio economic characteristics of tea farmers in Taraba State.

Variables	Frequency	%
Town		
Kakara and Nyiwa	195	95.6
Others	6	4.4
Gender		
Male	198	97.1
Female	6	2.9
Age		
> 30	33	16.1
31-60	144	70.5
> 60	27	13.4
Marital status		
Single	30	14.7
Married	171	83.8
Divorced	3	1.5
Years of education		
No formal education	81	39.7
1-6	123	20.6
7-12	39	19.1
> 12	42	20.6
Membership of cooperative Society		
Yes	105	51.5
Variety of tea planted		
1-3	186	91.2
≥ 4	18	8.8
Crops planted with tea		
≤ 2	162	79.5
> 2	42	20.5
Size of farm (has)		
≤ 2.0	153	75.0
2.1-5.0	51	25.0
Farm age		
Mean	22 ± 8 years	
Years of experience		
Mean	22 ± 9 years	
N = 204		

Source: Field survey, 2021.

The profitability analysis of tea intercropped farms is presented in **Table 3**. The total variable cost of tea intercropped farms in Taraba State was ₦1,099,661, while the average total variable cost per farmer was ₦5,390.50. The total fixed cost was ₦3,094,710 while the average fixed cost per farmer was ₦15,170.15. Also, the total cost was ₦4,194,371 and the average total cost per farmer was ₦20,560.64 in **Table 3**. The gross revenue for tea farmers is ₦2,910,000,243.3 and the gross revenue per farmer is ₦1,426,471.78. The gross margin is ₦289,900,581.9 and the gross margin per farmer is ₦1,421,081.28. The net income is ₦2,879,055,533.3 and the net income per farmer is ₦1,411,301.63. The amount of profit tea farmers make in Taraba State is ₦1,425,001 and the profit per farmer is ₦6985.30. Tea farming is profitable in Taraba State Nigeria [17].

Table 3. Profitability analysis.

S/N	Item	Amount (Naira)
1	Total Variable cost	1,099,661
2	Average Variable Cost/farmer	5,390.50
3	Total Fixed Cost	3,094,710
4	Average Fixed Cost/farmer	15,170.15
5	Total Cost	4,194,371
6	Average Total Cost/farmer	20,560.64
7	Gross Revenue	2,910,000,243.3
8	Average Gross Revenue/farmer	1,426,471.78
9	Gross Margin	289,900,581.9
10	Gross Margin/farmer	1,421,081.28
11	Net Income	287,905,533.3
12	Net Income/farmer	1,411,301.63
13	Profit	1,425,001
14	Profit/farmer	6,985.30

Source: Field survey, 2021.

Table 4 presented the determinants of the profit level of tea intercropped farms in Taraba State. In **Table 3**, $R^2 = 0.6068$ and F value was 16.89, significant at 1%. Also, labour costs (weeding, pruning, application of insecticide, watering), and cost of materials (cutlass, file, chemical, bag, and others), were all significant at various levels. Labour costs (weeding, others) and cost of materials (file, chemical, bag) has a positive effect on profit inferring their significance in tea intercropped production system. Labour

costs (pruning, application of fertilizer, watering) and cost of materials (cutlass, other materials) were negatively related to profit. The variables mentioned above though negative showed that as the cost of these activities decreases, then the revenue generated increases. The factors that influenced the profitability of subsistence tea production in Zimbabwe were the level of education, labour, yield/hectare and land area and extent of commercialisation [13].

Table 4. Determinants of profit level of tea intercropping.

Variable	Coefficient	Standard error	T
Labour costs			
Land clearing	–8.31	8.58	–0.97
Planting tea and others	–2.44	2.08	–0.12
Weeding	7.26**	2.91	2.49
Prunning	–1.82***	5.21	–3.49
Application of insecticide	–8.92**	4.02	–2.22
Fertilizer application	3.18	3.39	0.94
Watering	–1.82**	6.49	–2.81
Harvesting tea and others	4.61	9.38	0.49
Other costs	196.4**	9.66	2.03
Cost of materials			
Cutlass	–1.89*	9.80	–1.92
File	6.06***	3.85	15.74
Planting material	–1.20	9.01	–0.13
Fertilizer	7.23	1.28	0.57
Chemical	3.57**	1.86	1.92
Basket	1.76	5.09	0.35
Bag	1.31**	5.92	2.22
Other cost of materials	–1.97***	1.93	–10.21
Constant	2.15***	2.90	7.44
R-squared	0.6068		
Prob > F	0.000		
N	204		

Source: Field survey, 2021 *** P < 0.01 significant at 1%, ** P < 0.05 significant at 5%, * P < 0.1 significant at 10%.

5. Conclusions

The study estimated the profitability level and factors influencing tea intercropping system in Taraba State. The majority of the farmers intercropped with tea between 0 and 2 crops while the others intercropped with more than 2 crops. The total fixed cost is ₦3,094,710 while the average fixed cost per farmer is ₦15,170.15. Also, the total cost was ₦4,194,371 and the average total cost per farmer is ₦20,560.64. The gross revenue for tea farmers is ₦2,910,000,243.3 and the gross revenue per farmer is ₦1,426,471.78. Labour costs (weeding, others) and cost of materials (files, chemicals, bags) are also positively related to profit. Labour costs (pruning, application of fertilizer, watering), and cost of materials (cutlass, other materials) are negatively related to profit. The tea intercropping system is profitable in Taraba State.

Author Contributions

Oladokun Yetunde O.M: Methodology, data analysis, result and discussion.

Oluyole Kayode A: Introduction, empirical review and review of the whole write up before sending it out for publication.

Conflict of Interest

The authors declare no conflict of interest.

Data Availability Statement

The data used for analysis were primary data collected by the authors. Data can be made available if requested.

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References

[1] Sedaghathoor, S., Janatpoor, G., 2012. Study on effect of soybean and tea intercropping on yield and yield components of soybean and tea. ARPN Journal of Agricultural and Biological Science. 7, 664-671.

[2] Waheed, A., Hamid, F.S., Ahmad, N., et al., 2007. Profitability and morphological characters of inter-cropping of different vegetables in tea. Science Technology and Development. 26(3-4),

42-46.

[3] Baruah, S., Ahmed, N., Sulkia, S., 2005. Intercropping in young tea plantation. Natural Product Radiance. 4(1), 35-39.

[4] Sita, K., Rosyadi, A.I., Aji, T.M., 2018. Contract farming through tea-horticulture intercropping system: A case study of Gambung Estate and horticultural farmers in Bandung, Indonesia. Asian Journal of Agriculture and Development. 15(1362-2018-3542), 75-85.

[5] Josepha, M., Collinsa, O., Maryb, O., et al., 2009. Response of Tea (*Camellia sinensis*) to intercropping with African nightshade (Solanum scabrum). Journal of Agriculture, Pure and Applied Science and Technology. 1(9), 5-11.

[6] Yurteri, A.P.D.E., Küplemez, R.A.H., Seyis, F., 2022. Plant breeding based evaluation of Turkish tea [*Camellia Sinensis* L.(O.) Kuntze] genetic resources. New Development on Medicinal and Aromatic Plants-II. 227.

[7] Famaye, A.O., 2006. Handbook on tea production in Nigeria. Pamma Press: Akure. pp. 33.

[8] Kunstadter, P., Chapman, E.C., Sabhasri, S., 2019. Farmers in the forest: Economic development and marginal agriculture in northern Thailand. University of Hawaii Press: Honolulu.

[9] Heiss, M.L., Heiss, R.J., 2007. The story of tea: A cultural history and drinking guide. Random House Digital, Inc.: New York.

[10] Majumder, S., Sarkar, S., Ghosh, A., et al., 2022. Photosynthetic organs of wild Indian tea tree are rich in patchouli components: A GC-MS based metabolomics. Natural Product Research. 36(8), 2191-2195.

[11] Ahuja, P.S., Gulati, A., Singh, R.D., et al., 2013. Science of tea technology. Scientific Publishers: Jodhpur. pp. 475.

[12] Liu, J., Zhang, Q., Liu, M., et al., 2016. Metabolomic analyses reveal distinct change of metabolites and quality of green tea during the short duration of a single spring season. Journal of Agricultural and Food Chemistry. 64(16), 3302-3309.

[13] Lighton, D., Guveya, E., Bandason, W., et al., 2014. Socioeconomic determinants of smallholder out-grower tea (*Camellia Sinensis*) farming profitability in Chipinge District, Zimbabwe. Journal of Agriculture Economics and Rural Development. 150, 156.

[14] Van Ho, B., Nanseki, T., Chomei, Y., 2019. Profit efficiency of tea farmers: Case study of safe and conventional farms in Northern Vietnam. Environment, Development and Sustainability. 21, 1695-1713.
DOI: https://doi.org/10.1007/s10668-017-0073-z

[15] Chavas, J.P., Nauges, C., 2020. Uncertainty, learning, and technology adoption in agriculture. Applied Economic Perspectives and Policy. 42(1), 42-53.

[16] Nyakweba, T.O., 2019. Financial service accessibility strategies for farmers' economic empowerment in Kenya: A survey of small-scale tea farmers in Kisii County [Ph.D. thesis]. Nairobi: Kabarak University.

[17] Oluyole, K.A., Daniel, M.A., Yahaya, A.T., 2017. Diversity in the use of land for tea production and its effects on farmers' income in Taraba State, Nigeria. Journal of Agriculture and Rural Research. 1(2), 51-55.

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