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Business Intelligence as a Strategic Asset: Enhancing Decision Quality, Effectiveness and Performance in NGOs

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Abstract
The exponential growth of unstructured data has prompted organizations to adopt Business Intelligence (BI) tools. While BI adoption in profit-seeking sectors is well-studied, its use in non-governmental organizations (NGOs) remains underexplored. This study aims to fill this gap by investigating how BI technologies enhance decision-making quality, organizational effectiveness and performance in NGOs operating in Türkiye. Grounded in the Resource-Based View framework, the study posits that data quality is critical for BI to improve decision-making quality, ultimately leading to improved organizational outcomes. Survey data collected from 178 NGOs reveal findings consistent with the existing research in the for-profit sector. The results demonstrate that NGOs can leverage BI tools to optimize resource allocation and program implementation, align decision-making processes with their missions and goals, better serve their stakeholders, improve program outcomes, and enhance overall organizational effectiveness and performance. This study makes a significant contribution to the literature by highlighting the key role of BI technologies in the non-profit sector. Ultimately, this study underscores the transformative potential of BI technologies in improving decision-making and organizational outcomes in NGOs, offering a valuable foundation for future research and practical applications in the sector.

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The growth of unstructured data has necessitated the development of automated decision-making tools to enhance organizational and human decision-making (Power & Sharda, 2007). To enhance decision-making (Kulkarni, Robles-Flores & Popovič, 2017), organizations have made substantial investments Business Intelligence (BI) that extracts insights from this data profusion and enhances decision-making speed in organizations. Designed for data-driven decision-making, in this paper, Designed for data-driven decision-making, this paper argues that BI tools have strong potential to enhance NGO performance and effectiveness in fulfilling their altruistic missions by improving decision-making quality. Considering their impact, NGOs are presumed to benefit from reliable data to a greater extent as such data inputs steer BI tools and permit NGOs to better align their choices with their mission, goals, and resources. This study extends the literature by proposing that data quality facilitates BI-supported decision-making, leading to improved decision-making quality, ultimately enhancing NGO performance and effectiveness.

BI empowers organizations to leverage data for insights, informed decisions, adaptation, and competitive advantage in today's data-driven world. It converts vast unstructured data into useful information (Sharma et al., 2021) and primarily enhances decision-making capabilities, subsequently leading to improvements in organizational performance (Felder, 2012) and effectiveness (Turban et al., 2008; Kelidbari & Rayat, 2017). BI tools such as Quick Books Tableau, Microsoft Power BI, Plotly, and Gephi systematically analyze and transform data to provide insights into the organization's historical and current status (Sorensen, 2020). These tools consolidate data, create dashboards and reports, and generate actionable insights, enabling informed inferences and future projections. Ultimately, BI tools offer a faster, more agile, and resourceful response to organizations' necessities (Saucedo-Martínez, et al., 2018). This enhanced responsiveness is particularly critical for non-governmental organizations (NGOs) in achieving their missions.

NGOs navigating the complexities of data-driven operations, data quality is paramount. High-quality data are characterized by accuracy, timeliness, completeness, consistency, relevance, and fitness for use (Miller, 1996; Wang & Strong, 1996; Strong, Lee, & Wang, 1997). These fundamental principles of data quality provide the essential bedrock for effective mission fulfillment for NGOs. Conversely, poor data quality can hinder the generation of valuable insights (Chae et al., 2014; Warth, Kaiser & Kügler, 2011) that are crucial for NGOs' program design, resource allocation, and beneficiary targeting. This, in turn, can lead to inefficiencies such as less effective decision-making, increased operational costs, reduced program effectiveness, and ultimately, a diminished ability to achieve their social impact goals (adapted from Redman, 1998).

Decision-making involves selecting one course of action from a range of possibilities through a process of logical thinking. (Owda et al., 2019a). In the context of NGOs, decision-making involves crucial choices, such as allocating resources to specific programs (e.g., education vs. healthcare) in a particular region, prioritizing beneficiaries based on need, or selecting the most impactful campaign strategy. BI tools facilitate this process by refining, analyzing, and presenting data. BI tools process it to reflect past, present, and future trends, thereby enabling decision-makers to make more informed and up-to-date decisions (Gauzelin & Bentz, 2017). Furthermore, the effectiveness and efficiency of the decision-making processes are related to decision quality (Clark Jr., Jones & Armstrong, 2007), defined as the correctness and accuracy of decisions (Raghunathan, 1999). Existing research shows a positive correlation between data quality and decision-

making quality (Keller & Staelin, 1987; O'Reilly, 1982). For NGOs, this translates to a greater ability to make informed decisions that have a greater impact on the lives they aim to improve by identifying areas with the highest potential return and ensuring scarce funds are directed toward the most impactful programs.

More research is needed to understand how business intelligence tools are used to improve decision-making and their effects on organizational performance and effectiveness (Llave, 2019). It is equally imperative to consider their potential transformative impact on NGOs in particular. Existing research by Owda et al. (2019a; 2019b) and Lange (2021) addresses challenges in NGO decision-making and data management practices. However, these studies neither involve a data/information management approach nor do they incorporate BI into their research questions. Accordingly, this research intends to explore NGOs that operate in Türkiye, which have been increasingly relying on BI tools due to significant data growth.

The resource-based view (RBV) is adopted as the theoretical backdrop, with a specific emphasis on technology (i.e. BI tools) as a key resource. RBV highlights the critical importance of resources, skills, and capabilities in determining competitive advantage (Barney, 1991). Within this framework, RBV is presumed to be apt in explaining the relationships among resources, decision-making, and organizational outcomes. This framework can provide a comprehensive understanding of how data quality affects managerial decision-making supported by BI, subsequently influencing the organizational performance and effectiveness of NGOs. Therefore, RBV is offers an appropriate backdrop for this research as it provides a robust foundation for analyzing how BI tools contribute to competitive advantage and organizational success in the non-profit sector.

This endeavor aims to uncover how BI technologies enhance decision-making quality and subsequently affect overall performance and effectiveness in NGOs operating in Türkiye, making a unique contribution to the relevant research stream. The structure of this paper is as follows: After providing a literature review to define key concepts and establish the theoretical foundation, the methodology and findings are presented. This is followed by the discussion section, and the paper concludes with final remarks and outlines directions for future research.

Literature Review

Business Intelligence and Decision-Making in NGOs

Decision-making is a rational process that involves choosing one path of action among several others (Owda et al., 2019a). The rapid accumulation of unstructured data, combined with the increasing volume and rapidly changing context of information, requires the creation of methods to enhance organizational and human decision-making through automated decision-making tools (Power & Sharda, 2007; Olszak, 2016). As such, Business Intelligence (BI) involves technological methods and tools that effectively integrate and translate data into information/knowledge that supports informed decision-making (Popovič et al., 2012; Sharda, 2014; Jess & Member, 2019).

Business intelligence (BI) is considered as "data-oriented decision support systems" (Power & Sharda, 2007) that involves the collection, evaluation, preservation, and interpretation of data to facilitate informed decision-making, resource management, performance measurement, and operational optimization for managers at strategic, tactical, and operational levels (Watson & Wixom, 2010; Mohammad, 2012; Farzaneh et al., 2018; Abusweilem & Abualoush, 2019). Cheng et al. (2020) indicated that BI is a bidimensional concept with data integration and analytical capability. Data integration aims to combine and provide a unified view of data residing within different sources (Ferraris et al., 2019; Wamba et al., 2015), while analytical capability

concerns the effective deployment of methods to transform business data into valuable decision-making knowledge (Dubey et al., 2019; Wamba et al.,2017).

Consequently, organizations' need for data examination, data clarification, and processing has propelled BI tools to a critical role within organizations (Tunowski, 2015; Soltani & Siadati, 2019). These tools reduce ambiguity in decision-making by offering a holistic view and enabling quicker, more precise, and consistent decision-making (Torres Sidorova & Jones, 2018; Scholtz, Calitz, & Haupt, 2018). They provide efficient reporting and information analysis to understand both internal and external settings (Teoh et al., 2014; Solberg Søilen, 2015) and extract valuable insights from their operational data by uncovering previously hidden patterns (Pranjić, 2018), providing vital information for high quality and accurate decision-making (Teoh et al., 2014; Gauzelin & Bentz, 2017). Some frequently employed systems include solutions for ad hoc querying, spreadsheet analytics, and visualizing (Sabanovic, 2008; Popovič, Puklavec & Oliveira, 2019), along with data management techniques for assembling, archiving, and structuring data into data warehouses or data marts, along with running complex queries, reporting, presenting, and utilizing methodological approaches for forecasting (Sousa & Dias, 2020). Organizations, including non-governmental organizations (NGOs), commonly employ business intelligence software, which integrates reporting, analysis, and data mining features with visual tools to offer meaningful and concise information to decision-makers (Adiguzel, 2019).

NGOs are defined by the United Nations as "any non-profit, volunteer members' initiative established on a regional, nationally, or worldwide level that is task-oriented and led by individuals with a mutual curiosity" (Teegan et al., 2004). NGOs are not affiliated with either governments or businesses, and their mission is to promote and serve the public good rather than profit or the interests of a specific group (Owda et al., 2019a). Decades of global economic downturns, political instability, increasing national debts, poverty, disease, natural disasters, and environmental degradation have amplified the need for NGO interventions as governments struggle to formulate sustainable solutions to these issues. Especially in the vulnerable and underprivileged parts of the world, NGOs quickly flourished in order to address the political, social, economic, and environmental requirements. NGOs are indispensable in the constantly evolving world as they promote social justice and community well-being through adaptability, grassroots focus, and commitment to positive change.

NGOs face challenges distinct from those of for-profit businesses, often struggling with insufficient operational funding that impedes mission accomplishment. In addition, decision-making on actions, the extent and nature of activity, resource distribution, inter-organizational collaboration, and ensuring the safety of the affected as well as the relief staff is crucial (Knox Clarke & Campbell, 2020). For instance, in cases of crisis response, decisions are frequently made within time constraints (Knox Clarke & Campbell, 2020), and actions during humanitarian crises can have far-reaching consequences (Hayles, 2010). Given these circumstances, decision-makers need to consider the possible effects of their decisions on those affected by crises, relief groups, and employees. These possible outcomes are difficult to predict and evaluate, leading to ambiguity in the decision-making process. The unpredictable nature of the environments in which humanitarian intervention occurs, combined with the critical importance of emergency aid, can magnify the potential consequences of these decisions (Cosgrave 1996; Yu & Lai, 2011).

In the relevant stream of research, BI is theorized to facilitate decision-making by reducing information asymmetry as well as reducing confusion and vagueness (Shollo, 2013); however, more research is needed (Llave, 2019). More research is required to better comprehend how organizations can leverage BI to more

effectively transform data into valuable information and improve their decision-making processes at the operational, administrative, and strategic levels (Llave et al., 2018). Considering decision-making in NGO settings in particular, there are studies that explore information gaps, how, by whom, and when decisions are made (Heyse, 2013; Knox Clarke & Campbell, 2020). Owda et al. (2019a; 2019b; Al Shobaki, El Talla, & Al Najjar, 2023) explored the managerial challenges of decision-making in NGOs in the Gaza Strip while Lange (2021) collected data from Kolkata's slumps to update previously collected data. However, these studies do not delve into how BI improves the quality of the decision-making process in NGOs.

Data Quality and Decision-Making Quality

For NGOs, incomplete beneficiary data can lead to the misallocation of resources, hindering program effectiveness and potentially leaving vulnerable populations without critical support. Thus, the effectiveness of the decision-making process depends on data quality and reliable information (Adiguzel, 2019; Yeoh & Popovič, 2016). Data is considered to be of high quality if it is fit for use in operations, compliance, planning and decision making (Wang & Strong, 1996; Tayi & Ballou, 1998; Juran & Godfrey, 1999; Watts, Shankaranarayanan & Even,. 2009; Southekal, 2023:39). Consistency and comprehensiveness are also important aspects of data quality (Giovinazzo, 2009). Research indicates that one of the most critical success factors for BI implementations has access to clear and pertinent data (Işık et al., 2013).

The accuracy of decisions is defined as decision-making quality (Raghunathan, 1999). Initial literature provides evidence that data quality positively influences decision-making quality (Keller & Staelin, 1987; O'Reilly, 1982). Moreover, the quality of the decisions depends on both the quality of the data input and the process that transforms into actionable insights (Jannsen et al., 2017). BI tools are typically employed to enhance decision-making quality by refining, structuring, and analyzing data, thereby enabling faster and more accurate resolutions for a wide range of problems—from highly structured to highly unstructured ones (Visinescu, Jones & Sidorova, 2017). By structuring and analyzing data from diverse sources, BI tools enhance their usability, empowering decision-makers to make more informed choices based on high-quality insights. This, in turn, is deemed to enable NGOs to implement data-driven strategies that have a greater positive impact on the communities they serve.

Effects on Effectiveness and Organizational Performance

Effective decision-making is essential for organizational performance and effective operation. Effectiveness is "the degree to which an organization achieves its objectives" (Daft, 2007). Organizational performance relates to the ability to efficiently implement strategies to reach organizational objectives (Obeidat, 2016). For NGOs, effectiveness refers to achieving their social mission, such as delivering impactful programs, improving beneficiary well-being, or promoting social change. Performance metrics for NGOs might include program reach, service utilization rates, or cost-efficiency in achieving desired outcomes. The ability to assess performance using current and consolidated data is one of the major advantages of BI systems for decision-makers (Adiguzel, 2019).

The growing importance of BI is due to its expanding role in improving business performance, primarily through enhanced decision support (Guarda et al., 2013; Gauzelin & Bentz, 2017; Vukovic, 2020). By analyzing and processing existing data, BI tools provide timely and relevant information, helping organizations make correct, prompt, and informed decisions. This improves productivity (Haghighat et al., 2012; Arefin et al., 2015; Alasiri & Salameh, 2020) and, in the case of for-profit organizations, profitability (Olaru, 2014). With respect to NGOS, BI tools enhance their ability to deliver services, expand program reach, and ultimately serve more

beneficiaries. BI technologies improve decision-making speed by offering deeper insights into stakeholder behavior, improving the timeliness of reporting, and providing more effective control over performance (Alasiri & Salameh, 2020). Organizational effectiveness is significantly influenced by the usefulness of BI systems, as they empower managers with data-driven insights that support better decision-making (Turban et al., 2008; Kelidbari & Rayat, 2017).

Several frameworks exist for measuring NGO performance. Carman (2007) identified fundraising, inspections, cost, effectiveness, efficacy, and beneficiary satisfaction as common metrics. Benjamin and Misra (2006) categorize performance measures into inputs, outputs, results, and impacts. Inputs, monitor resources invested in a program, such as time, personnel, and finances. Outputs track program results achieved through resource utilization, focusing on delivered services and beneficiaries compared to set targets.

Given the positive global, societal, and individual impact of NGOs, more research is needed to explore how BI tools impact decision-making processes and, consequently, overall organizational effectiveness and performance within NGOs. BI tools improve decision-making processes by offering a clearer understanding of data and generating actionable insights that ultimately contribute to better outcomes in achieving the mission of NGOs. Accordingly, this study aims to highlight the role of BI tools in enhancing NGO performance and effectiveness by facilitating data-driven decision-making processes based on reliable and well-managed data inputs.

The Resource-based View

Organizations need an array of resources to create, select, and apply their strategies (Schulze, 1992). Essentially, the resource-based view (RBV) focuses on identifying and leveraging unique resources and capabilities within an organization to achieve sustained competitive advantage. For an organization, this depends on a bundle of resources that are valuable, rare, inimitable, and non-substitutable (Barney, 1991). Resources become particularly valuable when they facilitate the implementation of strategies designed to improve the efficiency and effectiveness of resource transfers between business units or across borders (Kruesi & Bazelmans, 2023:551).

Information technology (IT) comprises computer technologies such as hardware and software for processing and storing information, as well as communications technologies for transmitting information (Brown et al, 2012:1). IT is vital for organizations by facilitating communication, improving decision making and enhancing data organization (Beniger, 2009). Research suggests that managerial IT skills (Mata, Fuerst & Barney, 1995), collaborative partnerships between IT and business unit management (Ross, Beath & Goodhue., 1996), inter-organizational systems and the skills and expertise of the organization's workforce (Chatfield & Bjørn-Andersen, 1997) are potential drivers of competitive advantage. Furthermore, leveraging advanced technology can enhance an organization's resources, leading to growth in output, service provision, and overall operational efficiency (Inmyxai & Takahashi, 2010).

This study employs Resource-Based View as the theoretical background that identifies technology, particularly BI tools, as a valuable organizational ~~asset.~~ asset. By refining and presenting this data in an accessible format, BI tools support enhanced decision-making, thereby enhancing organizational performance and effectiveness. Dubey et al. (2019) further highlighted that BI projects can be viewed as a way to gain a competitive advantage that improves organizational performance. As such, BI tools can provide a

competitive edge for NGOs by transforming existing data into actionable insights, improving both decision-making and overall organizational outcomes.

Building on this understanding, this research aims to explore how data quality improves decision-making quality, which consequently influences organizational performance and effectiveness in NGOs. It is important to note that the quality of the data itself is determined by the processes through which it is collected, managed, and maintained, while BI tools enhance the usability and accessibility of this data for decision-makers. Therefore, the following hypotheses are proposed:

Hypothesis 1: *There is a positive and significant relationship between data quality and BI-supported decision-making quality in NGOs.*

Hypothesis 2: *BI-supported decision-making positively and significantly influences decision quality in NGOs.*

Hypothesis 3: *Decision quality positively and significantly influences NGO effectiveness.*

Hypothesis 4: *Decision quality positively and significantly influences NGO performance.*

Research Design And Methodology

Sample and Data Collection

This study focuses on Non-Governmental Organizations (NGOs) operating in Gaziantep, Hatay, and Istanbul, Türkiye. These provinces were chosen due to the significant number of NGOs established following the Syrian crisis. The target population includes NGOs registered in Türkiye that have demonstrably implemented diverse programs and projects for both Syrian and Turkish beneficiaries for at least five years. This selection criterion ensures a focus on established organizations with a proven track record of service delivery. Convenience sampling was conducted as the first author is a manager in a humanitarian aid NGO. A total of 550 NGOs were contacted, and 178 surveys were received with no-missing data, which yields to a 32,3% response rate.

The respondents included various NGO staff members who are responsible for making decisions supported by BI tools. The study identified Microsoft Excel, Microsoft Power BI, Tableau, and QuickBooks as the primary tools used. These tools are used within the NGOs for a variety of purposes, including data entry, basic analysis, program monitoring, financial management, budgeting, advanced data visualization and reporting as well as stakeholder reporting. We acknowledge that the usage of these tools can vary across the geographical locations of the NGOs and across the different roles of the respondents. Participants' demographic information is exhibited in Table 1:

Table 1

Respondent Characteristics

	Frequency	Percentage
Age Group		
26-35 Years	89	0,5
36-45 Years	72	0,404
46-60 Years	17	0,096
Gender		

	Frequency	Percentage
Male	150	84,3
Female	28	15,7
Education Level		
High school graduate	1	0,006
University degree	100	0,562
Master's degree	72	0,404
PhD degree	5	0,028
Type of NGO		
UN Agency	5	0,028
INGO	22	0,124
NGO	151	0,848
Size of the NGO		
0-50 employees	41	0,23
50-100 employees	31	0,174
100-200 employees	14	0,079
200-300 employees	25	0,14
300-500 employees	40	0,225
Above 500	27	0,152
Experience in the NGO sector		
1-3 years	14	0,079
3-5 years	32	0,18
6-10 years	112	0,629
Above 10 years	20	0,112
Experience in the current NGO		
1-3 years	98	0,551
3-5 years	38	0,213
6-10 years	38	0,213
Above 10 years	4	0,022
Current Position in the NGO		
Officer	43	0,242
Coordinator	39	0,219
Department Manager	69	0,388
General Manager	7	0,039
Consultant	11	0,062
CEO	9	0,051

Measures

A survey was designed to collect data in order to assess the proposed relationships. The questionnaire was approved by the Marmara University Social Sciences Research Ethics Committee. The questionnaire consists of 50 questions concerning demographic data, data quality, decision-making empowered by BI,

decision-making quality, organizational effectiveness, and organizational performance. The questionnaire was designed using the following measures: Data quality was measured by Wieder et al.'s (2012) 5-item scale, BI-supported decision making was measured using the 10-item scale developed by Sanz de Acedo Lizarraga et al. (2009), decision quality was measured using the 6-item scale developed by Wieder & Ossimitz (2015), and organizational effectiveness was measured using 9-items developed by Aboramadan & Borgonov (2016) and Mwai (2018), while organizational performance was measured using the 12-item scale developed by Aboramadan & Borgonov (2016).

Since the original measures were in English, the questions were translated into Turkish and Arabic and then back-translated to ensure that the concepts were clear and accurately conveyed. Except for questions about demographics, each measure was assessed using a 6-point Likert scale (1 = strongly disagree, 6 = strongly agree). For each construct, exploratory factor analyses with varimax rotation were conducted, and the average scores for each dimension were calculated.

The data, as shown in Table 2, are appropriate for dimension reduction using factor analysis. This is supported by the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the statistically significant results of Bartlett's Sphericity Test (p < ,001) across all measures. Furthermore, the reliability estimates for all scales exceeded the recommended threshold of 0,700 (Nunnally, 1978). Further details are provided in Table 2.

Table 2

Summary Information on the Factor Analyses

Construct	Cronbach's Alpha	Number of Items	Number of Factors	Total Variance Explained	KMO Measure of the Sampling Adequacy	Bartlett's Test of Sphericity
Data Quality	0,773	5	1	0,52847	0,783	0.000
Decision making	0,77	10	3	550,46	0.803	0.000
Decision Quality	0,788	6	1	490,61	0.806	0.000
Organizational Effectiveness	0,736	9	2	469,75	0.784	0.000
Organizational Performance	0,811	12	3	564,8	0.813	0.00

Accordingly, the Kaiser-Meyer-Olkin (KMO) values and the results of the Bartlett's Test of Sphericity for all scales are statistically significant. All of the Cronbach's Alpha values for the scales are above the threshold of 0,700 suggested by Nunnally (1978).

Findings

Table 3 offers a general summary of the relevant relationships by presenting the descriptive statistics and bivariate Pearson correlations between the variables.

Table 3

Pearson Correlation Results

Pearson Correlation	Mean	SD	1	2	3	4	5
Data Quality (1)	2,4236	0,69518	1				
Decision Making (2)	2,6028	0,59474	,396**	1			
Decision Quality (3)	2,677	0,75792	,195**	,562**	1		
Organizational Effectiveness (4)	2,5512	0,51933	,337**	,537**	,442**	1	
Organizational Performance (5)	2,4808	0,61708	,441**	,464**	,417**	,525**	1
*p<0,05; **p<0,01							

Two hierarchical regression analyses were run to test the hypotheses. Specifically, as the first set of independents, control variables such as age, gender, education level, experience in the NGO sector as well as the position and the experience in the current NGO of the participants, followed by NGO age, type and size were included. After the control variables, data quality, decision making, and decision quality were added as dependent variables for organizational effectiveness for the first model and organizational performance for the second model. The outcomes of these analyses are presented in Tables 4 and 5, respectively.

In the first model, data quality, decision making, and decision quality were evaluated as predictors of organizational effectiveness. As shown in Table 4, the control variables explain only 3,8 percent of the variance in organizational effectiveness, which is not statistically significant ($F_{(9;168)} = 0,734$). The inclusion of data quality increased the explained variance in a statistically and substantively significant manner ($\Delta R2 = 0,101$; $\Delta F_{(1;167)} = 19,628$; $p < 0,01$). Decision making was also found to be a statistically and substantively significant predictor ($\Delta R2 = 0,185$; $\Delta F_{(1;166)} = 45,279$; $p < 0,01$). Finally, the addition of decision quality further enhanced the explained variance in a statistically significant manner ($\Delta R2 = 0,028$; $\Delta F_{(1;165)} = 7,203$; $p < 0,01$).

Table 4

Regression Results for Organizational Effectiveness

	Model 1			Model 2			Model 3			Model 4		
	Regression Coefficient	Standard Error	Std. Coefficient	Regression Coefficient	Standard Error	Std. Coefficient	Regression Coefficient	Standard Error	Std. Coefficient	Regression Coefficient	Standard Error	Std. Coefficient
Control Variables												
Age	−0,13	0,073	−0,139*	−0,093	0,066	−0,099	−0,097	0,062	−0,104	−0,111	0,061	−0,118*
Gender	0,113	0,127	0,067	0,087	0,114	0,051	0,16	0,108	0,094	0,176	0,105	0,104*
Education Level	−0,077	0,084	−0,07	−0,052	0,075	−0,048	−0,06	0,071	−0,054	−0,057	0,069	−0,052
NGO sector Experience	−0,118	0,072	−0,143	−0,077	0,065	−0,094	−0,04	0,061	−0,048	−0,016	0,06	−0,019
Current NGO Experience	−0,041	0,058	−0,058	−0,012	0,052	−0,017	−0,025	0,049	−0,036	−0,031	0,048	−0,044
Position	0,053	0,041	0,115	0,043	0,037	0,093	0,035	0,034	0,075	0,043	0,034	0,094

	Model 1			Model 2			Model 3			Model 4		
	Regression Coefficient	Standard Error	Std. Coefficient	Regression Coefficient	Standard Error	Std. Coefficient	Regression Coefficient	Standard Error	Std. Coefficient	Regression Coefficient	Standard Error	Std. Coefficient
NGO Age	0,01	0,005	0,259**	0,01	0,005	0,268**	0,008	0,004	0,211*	0,008	0,004	0,198*
NGO Type	0,105	0,175	0,077	0,052	0,157	0,038	0,002	0,148	0,002	0,015	0,144	0,011
NGO Size	0,008	0,026	0,023	0,005	0,023	0,015	0,003	0,022	0,01	0,008	0,021	0,024
Independent Variables												
Data Quality				0,385	0,06	0,434***	0,265	0,061	0,298***	0,271	0,06	0,305***
Decision Making							0,352	0,071	0,340***	0,217	0,082	0,210***
Decision Quality										0,19	0,061	0,233***
Model Summary												
Adjusted R Square	0,049			0,232			0,326			0,36		
R Square	0,097			0,275			0,368			0,403		
Δ in R Square	0,097			0,178			0,093			0,035		
F for Δ in R Square	2,006**			41,059***			24,402***			9,770***		
F for ANOVA	2,006**			6,342***			8,792***			9,299***		
*p ‹ 0,10												
**p ‹ 0,05												
*** p ‹ 0,01												

Note: Provided in the Table are the results of four sequential regression runs. Model 1 regresses Organizational Effectiveness against the control variables only, and the following models include data quality, decision making and decision quality one after the other hierarchically.

In the second model, data quality, decision making, and decision quality were evaluated as predictors of organizational performance. As shown in Table 5, the control variables explain 9,7 percent of the variance in organizational performance, which is statistically significant ($F(9;168) = 2,006$; $p < 0,05$). Including data quality resulted in a significant increase in the explained variance of organizational effectiveness, improving the model's predictive power ($\Delta R2 = 0,178$; $\Delta F(1;167) = 41,059$; $p < 0,01$). Decision making was found to be a statistically and substantively significant predictor ($\Delta R2 = 0,093$; $\Delta F(1;166) = 24,402$; $p < 0,01$). Finally, the addition of decision quality further enhanced the explained variance in a statistically significant manner ($\Delta R2 = 0,035$; $\Delta F(1;165) = 9,770$; $p < 0,01$).

Table 5

Regression results for Organizational Performance

	Model 1			Model 2			Model 3			Model 4		
	Regression Coefficient	Standard Error	Std. Coefficient	Regression Coefficient	Standard Error	Std. Coefficient	Regression Coefficient	Standard Error	Std. Coefficient	Regression Coefficient	Standard Error	Std. Coefficient
Control Variables												
Age	−0,051	0,064	−0,065	−0,028	0,061	−0,035	−0,033	0,054	−0,042	−0,043	0,053	−0,055
Gender	−0,015	0,11	−0,01	−0,031	0,105	−0,022	0,055	0,094	0,039	0,067	0,092	0,047
Education Level	0,027	0,073	0,029	0,042	0,069	0,046	0,034	0,061	0,037	0,036	0,06	0,039
NGO sector Experience	−0,136	0,062	−0,196**	−0,111	0,06	−0,159	−0,066	0,053	−0,095	−0,048	0,053	−0,069
Current NGO Experience	0,009	0,05	0,016	0,028	0,048	0,047	0,012	0,043	0,02	0,008	0,042	0,013
Position	0,024	0,035	0,062	0,018	0,034	0,046	0,008	0,03	0,02	0,014	0,03	0,037
NGO Age	0	0,004	0,014	0,001	0,004	0,021	−0,002	0,004	−0,059	−0,002	0,004	−0,071
NGO Type	−0,008	0,152	−0,007	−0,042	0,144	−0,036	−0,101	0,129	−0,088	−0,091	0,126	−0,079
NGO Size	0,011	0,022	0,039	0,009	0,021	0,033	0,007	0,019	0,025	0,011	0,018	0,039
Independent Variables												
Data Quality				0,244	0,055	0,327***	0,101	0,053	0,136*	0,106	0,052	0,142**
Decision Making							0,418	0,062	0,479***	0,316	0,072	0,362***
Decision Quality										0,143	0,053	0,209***
Model Summary												
Adjusted R Square	−0,014			0,087			0,279			0,305		
R Square	0,038			0,139			0,324			0,352		
Δ in R Square	0,038			0,101			0,185			0,028		
F for Δ in R Square	0,734			19,628***			45,279***			7,203***		
F for ANOVA	0,734			2,697**			7,218***			7,464***		
*p ‹ 0,10												
**p ‹ 0,05												
*** p ‹ 0,01												

Note: Provided in the Table are the results of four sequential regression runs. Model 1 regresses Organizational Performance against the control variables only, and the following models include data quality, decision making and decision quality one after the other hierarchically.

Discussion And Conclusion

This study builds on the existing literature that positions BI technologies as essential tools for enhancing decision-making (Power & Sharda, 2007; Olszak, 2016) and ultimately improving organizational effectiveness (Turban et al., 2008; Kelidbari & Rayat, 2017) and performance (Guarda et al., 2013; Gauzelin & Bentz, 2017;

Vukovic, 2020). While much of the previous research has focused on the profit-oriented sector, this study addresses the gap in the literature by examining the role of BI technologies in NGOs, specifically those operating in Türkiye.

The empirical results reveal statistically significant positive relationships between data quality, decision-making quality, and organizational performance and effectiveness. The findings corroborate the research on for-profit businesses by Llave (2019) and Visinescu, Jones & Sidorova (2017) by indicating that BI systems not only reduce confusion and vagueness in decision-making but also improve the overall quality of managerial decisions. This, in turn, allows NGOs to make data-driven decisions that are aligned with their mission, ultimately improving organizational performance and effectiveness.

In particular, the findings of this study indicate that high data quality is a critical input for BI systems and is positively correlated with decision-making quality in NGOs. Earlier research has already established a positive correlation between data quality and decision-making quality (Keller & Staelin, 1987; O'Reilly, 1982). Popovič, Puklavec, & Oliveira (2019) highlighted BI applications as essential data-driven decision-support tools, facilitating the collection, storage, and presentation of data in a format conducive to effective decision-making. BI enables NGOs to utilize both internal and external data sources, which are cleansed and structured for more accurate analysis. This finding is consistent with that of Southekal (2023), who argues that quality data empowers BI tools to significantly improve decision-making by refining and structuring raw data into a usable format. As such, BI systems enhance decision-making capabilities by delivering high-quality, timely, and relevant information, which leads to more accurate and impactful decisions.

Furthermore, this study supports the assertion that high-quality decision-making, enabled by BI tools, positively influences organizational performance and effectiveness (Daneshvar & Palvia, 2016; Obeidat, 2016). The ability to make faster, more informed decisions is essential for NGOs to meet their objectives, particularly in resource-constrained environments where decisions must often be made under pressure (Knox Clarke & Campbell, 2020). By providing real-time insights into operational data, BI tools enable NGOs to optimize program reach, service delivery, and resource utilization, all of which contribute to improved program outcomes and increased stakeholder satisfaction (Carman, 2007; Benjamin & Misra, 2006).

From the perspective of the Resource-Based View (RBV), this study also confirms that BI tools can be considered a valuable organizational asset that contributes to competitive advantage. In the context of NGOs, BI technologies serve as a strategic resource that enhances decision-making quality, which then leads to improved organizational effectiveness and performance. This ultimately increases the organization's capacity to achieve its mission and goals. By providing decision-makers with high-quality insights, BI tools allow NGOs to better align their resources, strategies, and operations with their mission objectives. This alignment is critical for achieving both financial and non-financial performance goals, such as expanding program reach, improving service delivery, and enhancing stakeholder satisfaction.

Overall, this study demonstrates that BI technologies significantly enhance decision-making quality, leading to improved organizational effectiveness and performance in NGOs. The results underscore the importance of data quality in driving decision-making excellence and emphasize the role of BI in providing NGOs with the tools they need to achieve their mission goals more effectively. While there is still much to learn about the long-term impact of BI adoption in the nonprofit sector, this research lays the groundwork for future studies that can further explore how BI tools can be utilized to optimize NGO performance.

By focusing on the intersection of BI, decision-making, organizational effectiveness and performance, this study makes a unique contribution to the relevant research stream. The results provide a solid foun-

dation for future research and practical applications, particularly in expanding the use of BI technologies in non-profit organizations. As NGOs continue to face increasing challenges, BI tools offer a promising solution for improving decision-making, resource allocation, and overall organizational effectiveness and performance.

While this study provides important insights into the role of BI technologies in enhancing decision-making and organizational performance in NGOs, several limitations remain. First, the study is geographically limited to NGOs operating in Türkiye, which may affect the generalizability of the findings. Future research should explore BI adoption in a wider range of geographic contexts to better understand how different environments influence the effectiveness of BI tools.

Potential research could also incorporate qualitative data to provide a more comprehensive understanding through interviews and case studies. Additionally, longitudinal studies could provide further insight into how BI systems influence decision-making quality and organizational outcomes over time. Finally, exploring the role of organizational culture and leadership in facilitating the successful adoption of BI tools in non-profit settings could be another promising research avenue.

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