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THE EVALUATION OF THE DATA-DRIVEN MANAGEMENT APPLICATIONS AT SCHOOL

OKULDA VERİYE DAYALI YÖNETİM UYGULAMALARININ DEĞERLENDİRİLMESİ

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ÖZ

Araştırmanın amacı okulda veriye dayalı yönetim uygulamalarının değerlendirilmesidir. Araştırma nitel betimsel tarama modelindedir. Çalışma grubu Kastamonu ilinde görev yapan 46 okul yöneticisinden oluşmuştur. Veri yarı yapılandırılmış görüşme formu ile elde edilmiştir. 39 yönetici ile okullarında yüz yüze ve altı yönetici ile Zoom programı üzerinden toplantı gerçekleştirilmiş, bir yönetici ise görüşlerini mail yoluyla iletmiştir. Analizde özetleyici içerik analizi yönteminden yararlanılmıştır. Araştırma verinin yalnızca yönetsel karar süreçlerinin değil diğer tüm yönetsel süreçlerin de önemli bir bileşeni olduğunu ortaya koyması açısından önemlidir. Araştırmada veri hedef belirleme, karar, planlama, örgütleme, eşgüdüm ve kontrol süreçleri ile ilişkilendirilmiştir. Veri kaynakları makro, mezo ve mikro düzey öğrenme analitiği, veri depolama ve yedekleme, gerçek zamanlı veri akışı, erişilebilirlik, hız, davranış yönetimi, kestirim, dijital dönüşüm, eş zamanlı kontrol ve geri bildirim kontrolü, kanıta dayalı ve bireyselleştirilmiş öğrenme ve sanal öğrenme süreçlerinin geliştirilmesi işlevlerine sahiptir. Karşılaşılan sorunlar senkronizasyon, sahte korelasyon, veriye erişim, dokümantasyon, büyük veri, veri gizliliği, güvenilirlik, veri okuryazarlığı, veriden değer yaratma, yığın veri, veri yönetimi, veri kültürü, üst veri ve ağ bağımlılığıdır. Çözüm önerileri kurumsal örgütlenme, durumsal liderlik, ulusal politika, işlevsel arşivleme, ölçek veri marketi, temsili deneyim, veri aktarımında otomasyon, veri ekosistemi, veriye dayalı karar destek mekanizmaları ve yetkilendirmedir.

ABSTRACT

Purpose of study is to evaluate data-driven management applications at school. Study is in a qualitative descriptive survey model. Study group consists of 46 school administrators in Kastamonu province. Data was collected through semi-structured interview form. With 39 of administrators, interviews were carried out through face to face meetings, six of them through Zoom program and one of them sent views through e-mail. Summarizing as content analysis was applied for analysis. Study is important as it puts forth data can be an important component of all other management processes in addition to decision. In the study, data was associated with goal-setting, decision, planning, organizing, coordination, control. Data sources function as macro, mezzo and micro level learning analytics, data storage, back up, real time data-flow, accessibility, velocity, behavior management, prediction, digital transformation, concurrent and feedback control, evidence-based and individualized learning and developing virtual learning. Problems encountered are synchronization, spurious correlation, data access, documentation, big data, privacy, reliability, data literacy, value extraction, batch data, data management, data culture, metadata and dependency on web. Suggestions for solutions are institutional organization, situational leadership, national policy, functional archiving, scale data mart, representative experience, automation in data transfer, data ecosystem, data-based decision support systems, authorization.

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Introduction

To clarify what role data-driven applications can play for effectiveness of school administration processes is the driving force of this study. In Turkey, there have been many researches about school effectiveness. For instance, in a research carried out by Memduhoğlu and Karataş (2017, p. 227) teachers regarded the effectiveness level of their schools and school administrators as *average*. Similarly, in the research carried out by Toprak (2011, p. iii) primary school teachers asserted that the effectiveness level of their schools is average level. The same results were reached by Duranay (2005, p. 38) in which the secondary schools' efficacy level was found to be *average*. The international test scores can also be regarded as there are problems about school effectiveness in Turkey (Uğurlu & Demir, 2016, p. 68). There can be many components of school efficacy but effective leadership and effectiveness in administrative processes can be among the most important elements. Ertürk and Memişoğlu (2018, p. 55) found out that management skills of school administrators is an important part of school efficacy. Similarly, Gökçe and Kahraman (2010, p. 173) found out that school leadership is an important determinant for school efficacy. Moreover, Çubukçu and Girmen (2006, s. 121) concluded that the school administrator is the most important component of an effective school. These studies prove that efficiency of school administrators is one of the most important determinants of school effectiveness.

Problems encountered in school management processes constitute the most important threat for school effectiveness. So, it can be put forward that solution of the administrative problems at school through effective instruments can add to the efficacy of the schools. Solving problems can be regarded as a decision process (Arslanargun & Bozkurt, 2012, p. 362). Because decision processes are the base of all management processes including problem solving. School administrators face problems during their administrative roles and they cannot carry out their duties efficiently. As in other institutions, decision and problem solving processes are the most basic functions of school administration. Thus, effective management is directly related to effective decisions. Decisions taken at an organization are expected to be desirable for organization and employees. The achievement of administrators is determined by the outcome of the decisions they take. Thus, efficiency of an administrator in decision processes is a must beyond a desirable situation (Çelikten, 2001, p. 2).

Despite its importance, it can be alleged that school administrators do not have the desired capability for healthy decisions. Tabak, Şahin & Tabak (2020, p. 721) found out that administrators strictly adhere to the laws and regulations. Sezer (2016, p.132) reached the same results. Dynamic structure of schools requires dynamic solutions taking the situational elements into account. Thus, strictly adhering to the laws and regulations may hinder administrators from taking efficient decisions. Healthy decision making require setting up criteria but school administrators lack establishing consistent criteria decisions (Yaylacı & Beldağ, 2015, p. 173). Some factors can play an important role in effective decision making processes. For instance, Çelikten (2001, p. 9) asserts the efficient decisions of school administrators depend on having the necessary information for decision components and distinguishing facts from personal judgments. In this sense, it can be alleged that data can be the bases for effective decisions at school. Despite its importance, data driven decision making applications are not the at desired level in Turkey. The results of the research carried out by Tabak et al (2020, p. 721) confirm this thesis and they put forward that data driven decision making applications are limited at schools. Decisions are the base of all other managerial processes (Robbins & Coulter, 2012, p. 182) therefore it can be put forward that data driven decision making can also have a positive impact on all administrative processes at school.

Review of Literature

The concepts of *data* and *information* are generally used interchangeably but in fact they are different terms. *Data* consists of numbers and symbols whose correlations have not been set, whereas information is obtained from data sets the relationship of which are established in a given context (Liew, 2007, pp. 2-3). Data are facts which have not been processed and it cannot lead the activities. To be able to turn data into functional information, it has to be processed in a meaningful context (Melkas & Harmaakorpi, 2008, p. 108). To be able to make use of

data in the administrative processes at school, it has to be transformed into functional information. In this sense, the concept of data management treads the stage.

Data Management

Data management refers to the policies, plans and applications aimed at extracting value from data. Data management can be defined as the coordination and control of information production services dealing with identifying reliable information about a specific context and problem (Gordon, 2007, p. 54). Data management comprises all analysis processes for transforming raw data to information. Data management is important in all organizations as information management systems in an organization cannot be made compatible with each other without data management. Data management also ensures sharing information among information operating systems in an organization. Data management can also hinder communication gap and information loss in organizations (Gordon, 2007, p. 55). So, data management plays an important role for making use of data in the administrative processes in organizations.

Data Driven Management

Data driven management is a management approach which attaches importance to data flow in administrative processes aiming at minimizing ineffective applications by decreasing the unknown. A data driven approach in decision processes conserves organizations from facing surprises in administrative applications and thus contribute to making more effective decisions (Curuksu, 2018, p. 59). Understanding the importance of data and information for organizations lead institutions to store more data by establishing extensive databases (Jank, 2011, p. 1). This in turn resulted in utilizing data in administrative processes. Data driven management can have important functions in an organization and perhaps one of the most significant is the contribution to organizational learning processes. Anderson (2015, p. 214) denotes that data is significant for organizational learning processes. Therefore, data driven management can also add to the organizational learning. Through advances in obtaining, storing and analyzing data, tendency towards data driven management applications began to influence educational institutions too.

Data Driven Management at School

Today the school and its environment are increasingly becoming data rich. There are student information systems in many schools and school regions in which such data as the test scores, course transcripts, attendance, discipline, program participation is stored (Dougherty, 2015, p. 1). The complicated problems of education require a deeper understanding towards them (Knapp, Copland & Swinnerton, 2007, p. 76). Data can play a central role for such an understanding by clarifying conditions and contextual elements bearing problems. Data driven management in education can be defined as the educational management approach which regards data as a guide in administrative decisions and processes. Different types of data can be functional in data management processes and those are demographic data, instructional data, students' academic performance data (Datnow & Park, 2014, pp. 20-21) and perception data (Bernhardt, 1998; as cited in Datnow & Park, 2014, p. 21). These four types of data can contribute to the management processes at schools by guiding the administrative decisions and by enabling the school leaders to develop a deeper understanding for complex problems and dynamic structure towards their institutions. This study can play a significant role shedding light on the functions of data for educational management and on the current applications of data driven management processes at schools. The main goal of this study is to evaluate the data driven management processes at schools. In the framework of this main goal, the answers to the following questions will be searched for;

1. What level is the knowledge of school administrators regarding the concept of data and its extent?
2. What kind of data do the school administrators utilize during the school management processes?
3. How do school administrators make use of data in the management processes?
4. What are the opinions of school administrators regarding the effectiveness of data sources which can be applied in data driven management processes?
5. What are the problems encountered by school administrators for utilizing data in management?
6. What are administrators' suggestions for making data-driven management processes more effective?

Method

This study is a qualitative case study. The sampling consists of 46 school administrators who work in Kastamonu. Maximal variation and cluster sampling techniques were applied.

Data Collection Tool and Process

Data was collected by the semi-structured interview form developed by the researcher. For the development of the tool, first the literature was reviewed and a draft form was developed. The draft form was then sent to the experts to be reviewed. Finally, a pilot study was carried out with the draft interview form before the main application. The data was collected in four different ways; with 33 of the participants, face to face meeting was carried out and voice recordings obtained. With six of them, meetings on Zoom program was carried out and voice recordings were again obtained. With six of the participants, face to face meetings were carried out the data was collected in written form and with one of them, the data was gathered through e-mail in written form.

Data Analysis

For data analysis, summarizing as content analysis was applied through NVivo 12.2.0 Plus program. During coding process, for questions 2-6, closed coding technique was utilized. For question 1, open and closed coding were used together. After the meetings respondent validation technique was applied to ensure the correctness of the answers. After the data collection process, a focus group meeting was carried out to compare and contrast the collected data and the data gathered from the focus group meeting. To check the validity and reliability of the coding process, crosscheck technique was applied. The transcriptions were sent to three different experts[1] and they were requested to form codes and categories. When all the codes and categories were collected, they were compared and contrasted with each other and the with the codes and categories formed by the researcher.

Findings

In the research, six main questions were directed to the participants and the answers to these questions established the basis for the six main themes. Moreover, participants were addressed exploratory questions under the main questions and the answers to these questions formed the basis for categories and codes. The first theme determined in the study is *opinions of school administrators about the concept of data.* Categories and codes for the first theme have been presented in Figure 1;

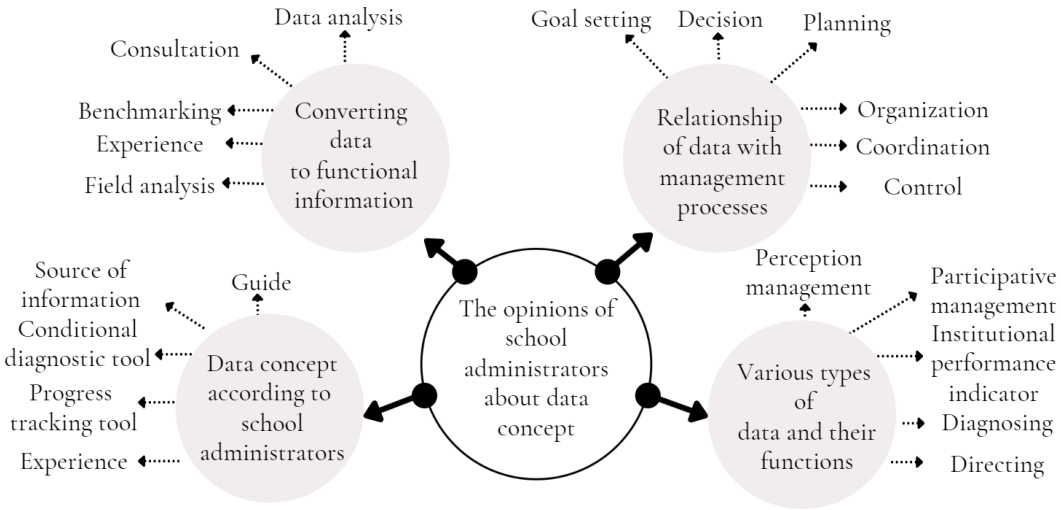

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Figure 1. Categories and Codes Under Theme 1

The school administrators regard *data* as *guide, source of information, conditional diagnostic tool, progress tracking tool* and *experience*. M13 stated; *the data can always be a guide for us as it was in the past and at present*. Data was also seen as the source of information as it was stated by M4; *data is the basis of knowledge*…. The data was also regarded as a tool to diagnose current conditions at schools. Performance data was also asserted as an instrument to monitor progress at school. School administrator also regarded data as *experience*. To transform data to functional information, data analysis is one of the ways put forward. Opinion sharing among the shareholders at school can also be an effective tool to obtain information. Benchmarking is comparing and contrasting performance data of different organizations (Daft, 2008, p. 54). School administrators asserted that benchmarking might be an effective tool to make raw performance data meaningful; *the data gathered at the school can be made functional by comparing and contrasting with the data gathered in the similar schools* (MY45). Data obtained about the effectiveness of the previous applications can serve as *source of experience*. Field analysis carried out by visiting schools was also put forward as a tool to reach functional information. School administrators associated data concept with goal setting, decision, planning, organization, coordination and control. Various types of data have five different functions. The first of them is perception management. Perception data gathered from shareholders can play an important role in managing the perception about school. Opinion data can be a tool for participative decision making processes. Different types of performance data can serve as an institutional performance indicator. Data can also function as a tool to diagnose problematic areas. Academic performance data of the students can be a mediator for effective guide for directing student towards appropriate areas. The second theme of the study was determined as *the various types of data which school administrators utilize in administrative processes*. Categories and codes determined are presented in Figure 2;

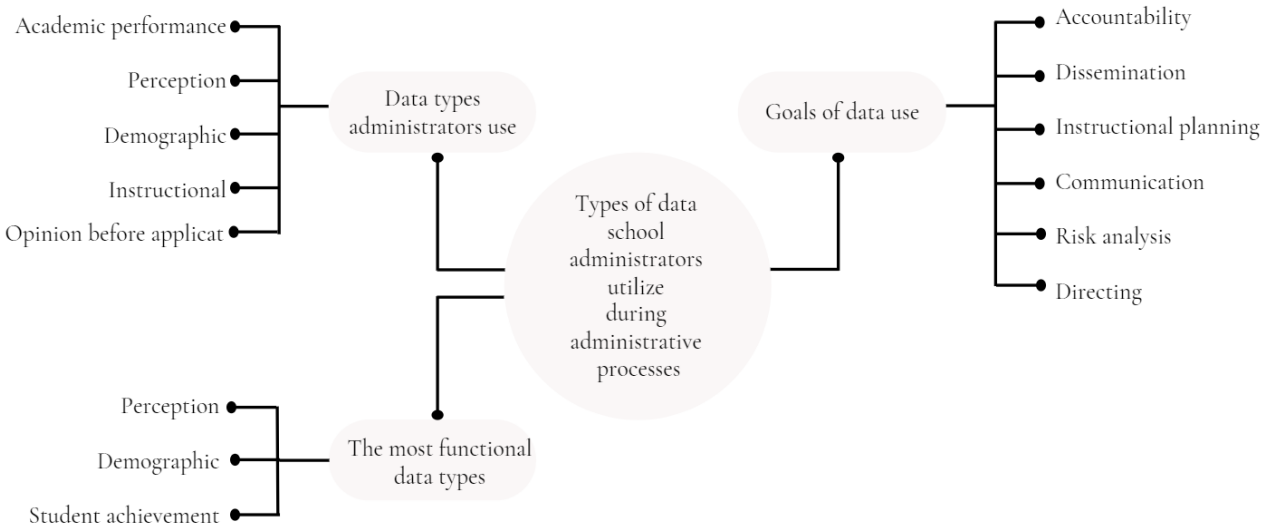

Figure 2. The Categories and Codes Under Theme 2

Data types which administrators make use of at school are *academic performance, perception, demographic, "instructional"* and *opinion before application data*. School administrators regarded perception, demographic and student achievement data as the most functional data types. Data plays an important role for accountability of administrative decisions and applications. Evaluation data about the effective instructional and administrative applications is functional for the dissemination of the best practices. Administrator also use data for instructional planning. Data based communication add to the communication processes at school. Data can also guide school administrators for the risk analyses. Performance data of the students can be a tool for effective directing. The third theme determined in the study is *how data is used in administrative decision processes*. Categories and codes determined under the theme are presented in Figure 3;

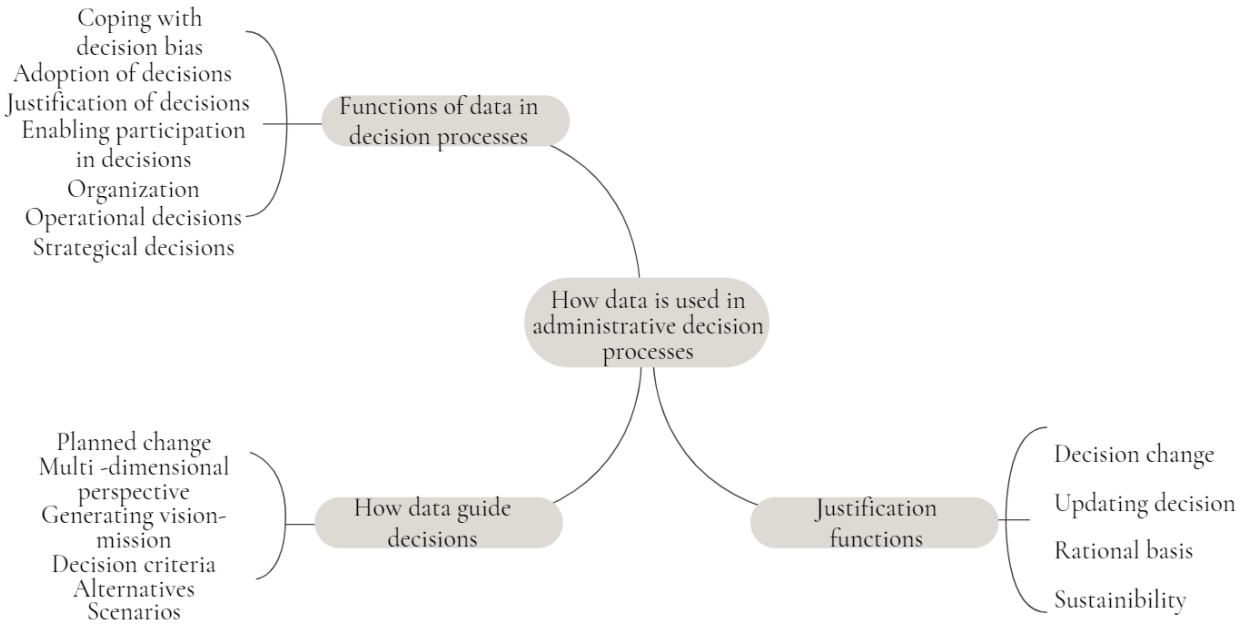

Figure 3. The Categories and Codes Under Theme 3

Data can be a tool for coping with decision bias. M10 stated that he made use of data to convince 12th grade students to attend universities with the entrance exam grades of the first year. The perception and opinion data can help adoption of the decisions by the shareholders. Moreover, the evaluation data for the administrative applications can justify decisions. Opinion data can be the basis for participative decision making. Data about students and teachers can be a tool for establishing effective working teams. Trainings which the teachers and students attended can lead team forming effective teams. Data can be functional both for the operational and strategical decisions. Data can be functional in planned change processes at school as M20 states data can have a *softener* role during management change. Data can also pave the way for a multi-dimensional perspective. As data will enable administrators to form a healthier understanding towards their schools, it can also be the basis of generating vision and mission. Data can accelerate the decision processes by setting the basis for decision criteria. Decision can be defined as the process of choosing among alternatives (Fitzgerald, 2002, p. 8) and data can serve as a tool to diversify the alternatives for administrators. Scenarios are also at the center of the decision processes (Grünig & Kühn, 2005, p. 44) and as M9 mentions data can be a basis for scenarios especially in rural areas housing risks for students. School administrators utilize data for changing and updating decisions. They also apply to data to form a rational basis for their decisions as M4 denotes; *"Data is an evidence to justify our decisions and I believe we should perpetually base our decisions on rational roots…"*. The fourth theme is *the functions of the data sources which school administrators make use of*. Categories and codes determined under this theme are presented in Figure 4;

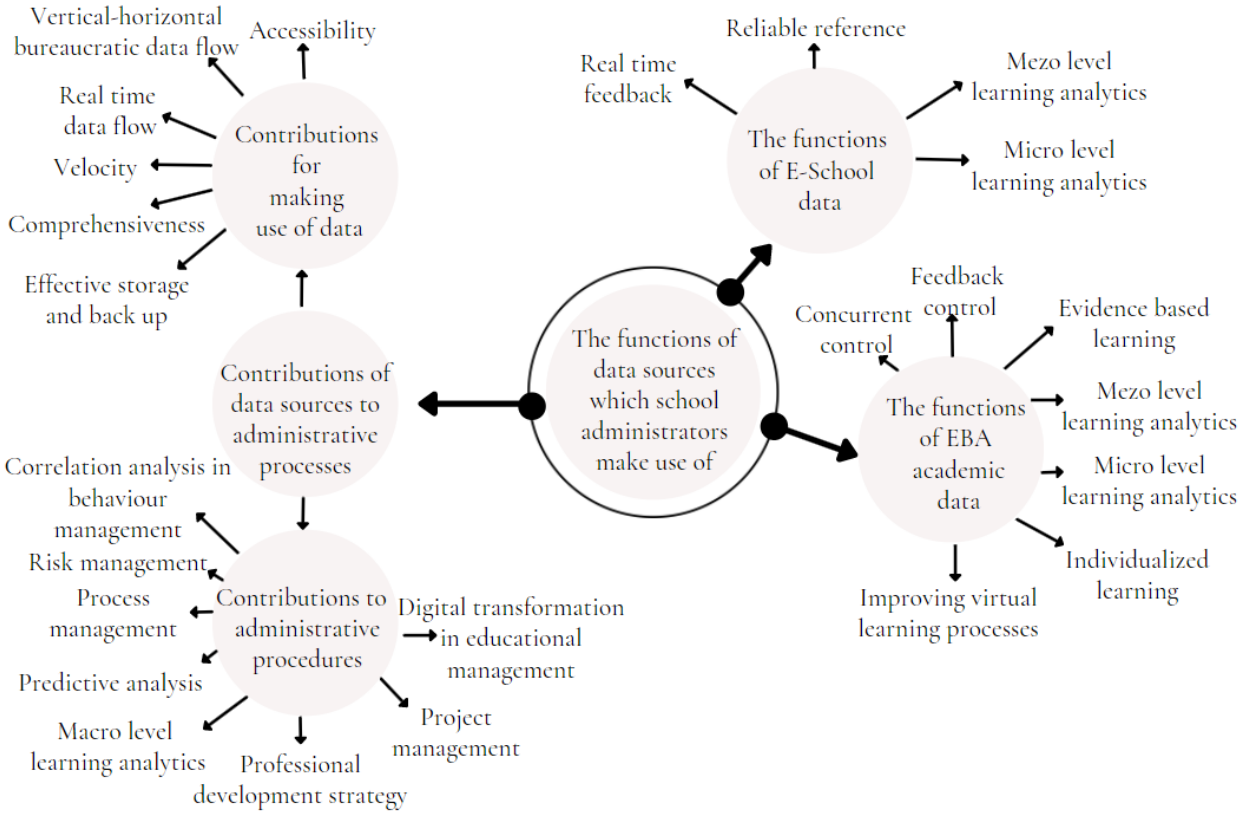

Figure 4. The Categories and Codes Under Theme 4

Data sources used by school administrators are functional in storing and backing up data. M16 attracted the attention to the importance of management information system (MEBBİS) in preventing data loss. School administrators also asserted that the information systems utilized at school enable them with access to extensive data about students. M22 denoted that it is possible to get information about all the students through management information systems. The systems also ensure administrators to reach data faster. Systems also provide real time data flow to management. Management information systems are also functional in data exchange among different levels of educational management. Data sources at school make data accessible for administrators. Demographic data can shed light on the reasons why students develop certain behavior modes. Data gathered from psychological consultation and counselling service about health conditions of the students can play an important role in risk management. Data can also be a tool for process management. Data can add to educational planning processes by providing consistent predictions. M13 asserted that the number of students who will enroll determines such factors as the number of the sessions teacher will attend each week. Data gathered from MEBBİS can contribute to healthy professional development strategies as the system houses trainings teachers obtained before and as it sheds light on their professional development needs. As data sources provide administrators with educational and training backgrounds of the teachers, they might help establish skills based project teams and this in turn will contribute to the project management processes.

M37 denoted the importance of E-School system for providing real time feedback for students' attendance data. M11 asserted the importance of the E-School system for ensuring reliable data. Learning analytics is the process of gathering, analyzing and reporting data about learners and learning environments to be able to improve learning (Siemens, 2013, p. 1382). M20 attracted attention to the function of E-School for learning analytics by saying; …*We can monitor the grades of the students and when we notice a failure we try to understand whether there is a problem or not*…. When data about learning processes gathered about the school level this is called mezzo-level learning analytics (Shum, 2012, s. 3). As students can track their own progress on E-School, system can be the basis for

micro-level learning analytics (Shum, 2012, p. 3). MY45 denoted this function; *As e-School demonstrates personal and academic situation of students, it can be functional in both personal and educational-instructional planning.*

EBA academic platform can serve some functions and the first one is concurrent control. Concurrent control refers to the control processes where one intervene performance deficits at times when they are observed (Williams, 2009, p. 597). M41 denoted that especially during the pandemic EBA played an important role in monitoring student performance and in diagnosing performance drawbacks. It was also found out that EBA can also play an important role for feedback control which aims at correcting performance flaws after they are observed (Williams, 2009, p. 597). M32 drew attention to the significance of EBA academic platform for feedback control with the following words; …*These were also reflected on EBA reports. How many students attended the sessions? How many activities were fulfilled?* It was also revealed that data gathered from EBA can help processes of evidence based learning as the data for achievement can be regarded as an evidence for learning. As in the case of E-School, EBA academic can also be a functional tool for both mezzo and micro-level learning analytics. Arnold and Pistilli (2012, p. 267) put forward that put forward that data about students can contribute to individualizing learning. M17 denoted that; *"…EBA shows how motivated our students and teachers are. It also clarifies what level of achievement we expect from some of the students in the following year and what precautions we should take for some students…"*. Thus, EBA academic can help individualizing learning processes by letting administrators focusing on the individual learning needs. M4 stated; *"…We make use of EBA data to improve distance learning…"*. As the fifth theme *the problems school administrators face during utilizing data* was formed. Categories and codes nested under it are presented in Figure 5;

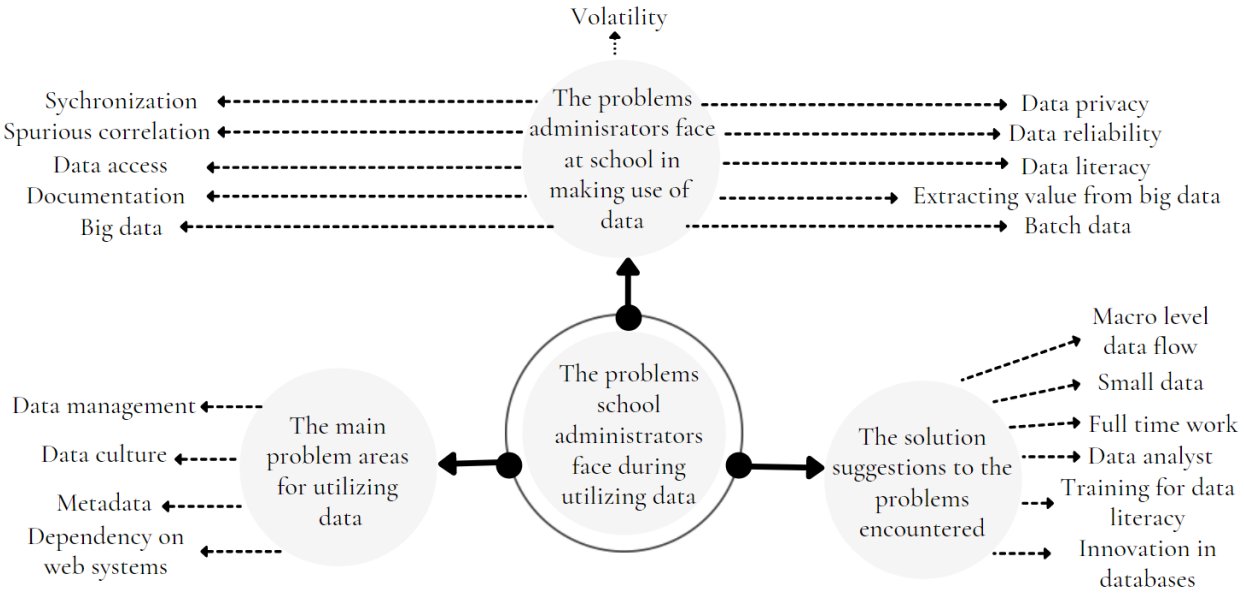

Figure 5. The Categories and Codes Determined Under Theme 5

Big data was put forward as an important problem for making use of data. M43 denoted this problem by denoting the statistics about the number of students fir each classroom recorded on province level. Another problem is documentation. MY 1 stated that there can be some data storage problems in databases. M5 denoted the problem of data access; *We can have access problems to data and we need more detailed data about students.* Spurious correlation occurs when the results of the data analysis cannot be interpreted correctly and this might result in false inferences (Fan, Han & Liu, 2014, s. 298). M38 stated that either due to the difficulty of getting reliable data or of interpreting the results, it is possible to make false correlations among situations. Synchronization problem has been taken as the problem of real time data sharing among different institutions. M23 voiced about the problem of data sharing between Ministries of Health and National Education especially during the

pandemic. Volatility refers to the situation that data loses its validity very easily (Srinuvasu, Koushik & Santhosh, 2017, p. 253). M12 denoted this problem with the following words; *We get data from MEBBİS and e-School, but as the school is a live environment, things are changing monthly, weekly and even daily*… Data privacy and reliability were asserted as important problems by school administrators. Furthermore, data literacy is regarded as a significant problem and MY1 asserted that the school administrators' knowledge about data concept is not sufficient. Another problem encountered during using data is *batch data.* Batch data is the data stored in databases by collecting and storing as a whole in different times (Asunçao, Calheiros, Bianchi, Netto & Buyya, 2014, p. 6). M32 denotes this problem by saying; *We have data but it may not encompass our research. We have data we still have to collect data to meet our need or solve the current problems at hand.*

One of the problem areas asserted is data management. M5 emphasized the problem of data collecting and analyzing problems for making use of data. Absence of data culture was put forward as another main problem area as M4 remarked: …*but unfortunately, we do not have a data collecting culture at schools.* Metadata was alleged as another problem area. Metadata can be defined as *data describing other data* (Caplan, 2003, p. 1). Metadata eases reaching data related data among big data sets. M10 remarked that databases used do not provide administrators with getting access to data about students from different perspectives such as their hobbies, inclinations, social activities etc. The last main problem area mentioned is the dependency on web. M5 emphasized the problem; *We get the data from the systems and in case there is a problem in the system resulting from the server, we have problems obtaining data. We experience problems as we are dependent on the systems.*

The last category determined under the theme is *the solution suggestions to the problems encountered.* The first code nested under this category is macro-level data flow. MY15 attracted the attention to the data sharing among schools from different educational levels for solving the problems of data use. Another solution was alleged to be using small data. School administrators (M43, M25) think that when assessing schools, local data instead of big data should be referred. M30 puts forward that teachers are the best sources of data and a full time work for teachers can be functional in solving problems of data use. M43 alleges that data analysis is a professional process and thus data analysts should be responsible for analyzing data. MY3 stated that training both teachers and students about data literacy can be functional for coping with the difficulties. M22 offered E-School system to provide e-portfolio for students to deal with the problems. This can be regarded as innovation in databases used at school. The last theme determined in this study is the *suggestions to make data driven management applications at school more effective.* Categories and codes nested under the theme are presented in Figure 6;

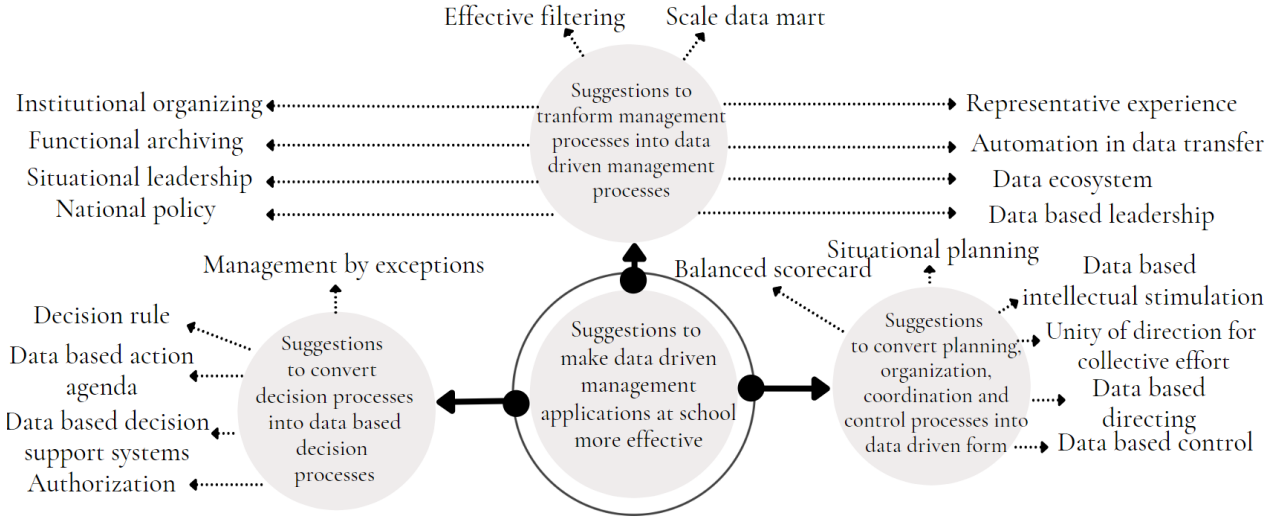

Figure 6. Categories and Codes Nested Under Theme 6

Suggestions asserted by the school administrators have been studied under three main categories. The first category is the *suggestions to transform management processes into data driven management processes*. Under this category, the first code is *national policy*. MY3 emphasized the significance of *national level policy* to standardize data driven management applications. M30 denoted the importance of situational leadership: *I think some rules should be made flexible depending on data*…. M43 stated that never changing data about his school is requested from the upper level management authorities from time to time and he thinks this results in an undesirable workload for him. Functional archiving can the solution. MY7 offered charging a teacher for being responsible for data flow from classroom level to management. MY21 denoted that he wanted to group students in e-School system according to some of their characteristics but the system did not allow to do so. Effective filtering installed in databases can solve this problem. M12 denoted that there are many scales used to collect data in different schools and school regions and he offered to set up a scale data mart in EBA system from which similar schools can make use of. M34 stated that evaluative data about the activities can serve as a reference for future activities and administrative applications. Therefore, this can be regarded as representative experience for school administrators. M26 offered automatic transfer of the students' data between different levels of schools to convert management processes into data driven management form. Another solution alleged is *data ecosystem*. M11 stated that achievement measurement tests, evaluation surveys and participative meetings should be carried out. M23 voiced the significance of data based leadership by focusing unifying power of data driven management approach: *"Data is important for gathering the views of different shareholders and increasing the respect for the school administrator"*.

The second category under the theme is *suggestions to convert decision processes into data based decision processes*. The first code is management by exceptions. School administrators think they should be allowed to take initiatives and upper level management should interfere only when there is a problem beyond their capacity. M28 offered grouping students according to their profiles to make administrative decisions more effective. They asserted that grouping students according to their profiles can be the basis for decision rules during the distribution of social aids. Administrator also suggested basing actions on a data based approach in order to transform decision processes into a data driven form. M32 offered setting up public relations units at crowded schools to allow data sharing between school and its environment. M36 suggested establishing a module for psychological consultation and guidance department where teachers could write open ended ideas about students. These could be regarded as data-based decision support systems. M5 and M42 suggested authorizing school administrators to get access to private data about students to turn decision processes into a data based form.

The last category under the theme is *suggestions to planning, organization, coordination and control processes into data driven form*. It was found out that *balanced scorecard* could be a tool. A balanced scorecard is a reference for the fulfilled performance of organizations (Gough, Harper, Hill & Selden, 2009, pp. 30-31). M11 stated that data about performance should be gathered on a regular basis and they should be compared with each other. Situational planning was put forward as another instrument. M30 stated: *The time the lessons start is determined in a scheme or by the governor. But if I work in a school which is located in a rural area…I worked at… before and I used to start the lessons at 09:00… because the students came from rural areas 30-35 kilometers away*…. M19 thinks that data about skills and capabilities could be used to stimulate the students towards the suitable areas and activities for them. MY3 offered a booklet which would be prepared by the ministry to form unity in data driven management applications at schools. It was found that student academic performance data could be used for directing students to areas of study appropriate for them. It was also revealed that data based control processes can serve as a springboard to convert management processes into a data driven form.

Discussion

School administrators have some kind of understanding for the data concept and the concepts which they associate data with complies with literature. For instance, Schumaker (2011, p. 43) defines data as the main constituent of information, knowledge and wisdom. The fact that administrators defined data as *source of* information can be the sign of an understanding towards data concept. School administrators alleged different

premises about converting data to functional information such as data analysis, benchmarking, consultation, experience and field analysis although data analysis is regarded to be the most significant tool (Abecassis, Flores & Montakhab, 2014, p. 2). Though they have an understanding for the importance of data analysis, the competency of the administrators is prone to questioning. In a research carried out by Dilekçi, Nartgün and Nartgün (2020, p. 236) %80 of participants remarked they needed training for data analysis. Therefore, training school administrators for data analysis might be crucial for data-driven management applications.

When literature is reviewed, it is observed that data driven management studies focus on data based decision making processes (Blake, Gregory, James & Hasan, 2016; Keuning, Geel, Visscher & Fox, 2016; Kowalski, 2009; Orland, 2015; Reeves & Burt, 2006; Schildkamp, Poortman, Luyten & Ebbeler, 2016; Spillane, 2012). This study is important as it proves the functions of data in other management processes as planning, organization, coordination and control. In addition to these processes, data was also associated with goal setting and it can be put forward that current performance data of schools can guide goal setting procedures. Actually, it is not surprising that data can play an important function in all phases of management as well as decision as decisions are the base of all other managerial processes (Robbins & Coulter, 2012, p. 182).

About the data types which are used at school, administrators alleged instructional data. Administrators confine instructional data only to the instructional performance data of teachers. Administrators make use of only the data which they gather from classroom observations. However, their competence and knowledge about the curriculums, latest teaching and learning tools and the latest trends in instructional performance can also be the components and sources of instructional data used during data driven management processes. The most functional data were found out to be perception data, demographic data and student achievement data. Findings are supported by literature. In the study carried out by Sun, Johnson and Przybylski (2016, p. 96), these tree kinds of data were founded out to be among the six most functional data types at school. Dilekçi et al. (2020, p. 238) revealed that perception, demographic and student achievement data are the most common data types used by school administrators. Although all kinds of data can be functional in school management processes, some variables as the type of school and the environment which it serves can be determining factors about which types of data will be more influential. Data is applied for many functions at schools and directing is one of those. In the research carried out by Eğmir and Çelik (2021, p. 952), directing was revealed to be one of the most prevalent problem areas in education. A data driven approach can play an important role in solving directing problems at schools in Turkey.

Data driven approach in administrative decision processes at school can fulfill certain functions as coping with decision bias, participation in decision processes and adoption of the decisions taken by administrators. Data can also be in the center of planned change processes. Pellettiere (2006; as cited in Douglas, Muturi, Douglas & Ochieng, 2017, p. 680) alleges that %70 of change initiatives at school result in failure. Data can add to change processes by establishing a more systematic and planned basis for change. Evaluative data about administrative applications can be the tool for smooth transition in cases of management change.

Data sources applied at school have important functions as effective storage and back up, comprehensiveness, velocity, real time data flow, vertical and horizontal bureaucratic data flow and accessibility. The dynamic structure of school (Chongbang, 2021, p. 106) require real time data flow in school management processes. In this regard, data sources can play an important role in keeping up with the dynamism of schools. As schools are open systems, they have a close relationship with their environment (Himmetoğlu, Ayduğ & Bayrak, 2017, p. 47) and data can be a tool for schools to establish healthy relationships with their environment by allowing to monitor the perception of the institutions in societies and environments they serve and by setting up a better understanding for the expectations of society. Data sources applied at school might also have functions in operational procedures. One of the main objectives of schools is to develop desired behaviors for students (Metzler, Biglan, Rusby & Sprague, 2001, p. 448). So, data can assist administrators develop desired student behaviors by enabling them to obtain an understanding towards the reasons of undesired behaviors. Başar (2001,

p. 130) denotes that having data about students is significant in terms of setting up an understanding for student behaviors. In this sense, it can be alleged that data is important for behavior management. Data sources are also functional in macro-level learning analytics as they allow comparisons of performance on national level. E-School is important for both mezzo and micro-level learning analytics as it provides data for comparison among classes and also performance data for individual assessment for academic achievement levels. EBA academic is also an important data source for concurrent and feedback controls, mezzo and micro-level learning analytics, evidence based and individualized learning and improving virtual learning processes.

As it was also put forth by this research, big data is one of the most prevalent problems of utilizing data in school management processes. Cielen, Meysman & Ali (2016, p. 1) define big data as the type of data which is difficult to analyze through classical data management systems. When the competency of administrators for analyzing data is taken into consideration, it can be alleged that big data sharpens the analyzing problem. Local data can be the solution for problems arising out of big data. Moreover, it difficult to extract meaning out of big data sets which poses another serious problem. Analysis capacity of administrators might also lead to spurious correlations for variables of school management processes. Volatility of data gathered at school is also an important problem as data at school loses validity very fast. Data privacy also hinders administrators from reaching functional data in school management processes. Main problem areas are data management, data culture, metadata and dependency on web.

To convert management processes into a data-driven form, national policy, situational leadership, scale data marts, data ecosystem and data-based leadership can play a central role. Cemaloğlu (2007, p. 75) asserts that situational leadership takes contextual components into account during management. Thus, decentralization in education can help placing data in the center of school management processes. Performance data plays an important role in school management processes. Therefore, creating a balanced scorecard for schools can contribute to data-driven management processes. Taking precautions for unity of collective effort on national level can also be functional for data-driven transformation.

Conclusion and Recommendations

School administrators have an understanding for *data* concept and its significance in school management processes. However, their competency is limited in such areas as data analysis and converting data to functional information. Data can play a central role in all phases of school management as well as decision processes. Data sources have important functions in data-driven management applications. School administrators face different problems during data-driven management processes and in the light of their experiences, they have some solution offers. There are certain precursors for data-driven management at schools. Though the most important responsibility is in the hands of school administrators, for a whole transformation to data driven management or converting the current applications into more effective processes, some suggestions can be made. First, on the national level, policy put forth by 2023 vision document (MEB, 2018, p. 38) should be converted into concrete action plans. For instance, school administrators ought to be provided with training on data analysis and tools to convert data to functional information. Legal basis for decentralization in educational management should be set up to allow school administrators utilize small local data in administrative processes. Precautions ought to be taken to increase the data literacy levels of administrators. Balanced scorecards ought to be prepared for each school for every year. A digital transformation office should be established in the Ministry of National Education and a system allowing data flow among different levels of educational institutions should be set up. A big data database should be set up (Cemaloğlu, 2019, p. 323) and it should be referenced by the authorities in the central management organization. Researches about macro, mezzo and micro-level learning analytics should be carried out by authorities. Innovation and improvement activities ought to be carried out for management information systems. Scale data marts should be established in regional level and these should be designed in open access mode. Accountability based on performance data should be encouraged. Schools ought to be encouraged and assisted in developing data-based decision support systems.

School administrators will play the most important part in this process so they should take it as a personal responsibility to improve themselves in terms of data analysis. They ought to develop in terms of digital literacy as digital platforms play an important role for data-driven management applications. Data should be placed in the center of all change processes at schools and it must be utilized a soft transition tool during management changes. School administrators must refer to data about needs and competencies of teachers for establishing professional development strategies. Effective metadata must be created for archiving the data gathered. Data based action agendas ought to be created at schools.

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GENİŞLETİLMİŞ ÖZET

Araştırmanın amacı okulda veriye dayalı yönetim uygulamalarının değerlendirilmesidir. Araştırma betimsel tarama modelinde nitel bir araştırmadır. Araçsal durum incelemesi yönteminden yararlanılmıştır. Örneklemi Kastamonu ilinde görev yapan 46 okul yöneticisi oluşturmuştur. Okul yöneticilerinin 34'ü okul müdürü, 12'si müdür yardımcısıdır. Maximum çeşitlilik ve kümeleme örnekleme yöntemlerinden yararlanılmıştır. Veriler yarı yapılandırılmış görüşme formu ile toplanmıştır. Alan yazın taranarak taslak form oluşturulmuş ve form uzman görüşüne sunulmuştur. Uzman görüşü sonrası taslak form pilot uygulamaya tabi tutulmuştur. Süreçte 39 okul yöneticisinin okulu ziyaret edilmiş, altı okul yöneticisi ile Zoom programı üzerinden toplantı gerçekleştirilmiş, bir yönetici ise görüşlerini e-mail yoluyla iletmiştir. Verilerin analizinde özetleyici içerik analizi yönteminden yararlanılmıştır. Analizler NVivo 12.2.0 Plus programı üzerinde gerçekleştirilmiştir. Analizde ilk soruda açık ve kapalı kodlamadan birlikte, diğer sorularda ise açık kodlamadan yararlanılmıştır. Transkripsiyonlar için Jefferson transkripsiyon sisteminden yararlanılmıştır.

Geçerlik ve güvenirlik için çeşitli çalışmalar yürütülmüştür. Veri toplama sürecinde günlük rapor tutulmuştur. Yanıtlayan doğrulaması yönteminden yararlanılarak bazı katılımcılarla birden fazla görüşme gerçekleştirilmiştir. Ayrıca üçleme yönteminden yararlanılmış ve bazı okul yöneticilerinden yazılı dokümanlar da alınarak incelenmiştir. Görüşmeler sonrasında ana uygulamada yer almayan dört yönetici ile odak grup görüşmesi gerçekleştirilmiş ve elde edilen veriler ana uygulama verileri ile karşılaştırılmıştır. Gerçekleştirilen kodlamaların geçerliliğini test etmek amacıyla üç farklı uzman ile çapraz kontrol uygulaması gerçekleştirilmiştir.

Araştırmada altı alt amaç çerçevesinde bulgular altı farklı tema altında ele alınmıştır. İlk tema altında dört, diğer temaların her birinin altında ise üçer kategori yer almıştır. Çalışmada belirlenen ilk tema *okul yöneticilerinin veri kavramı hakkındaki düşünceleridir.* Bu tema altında oluşturulan ilk kategori *okul yöneticilerine göre veri kavramı* kategorisidir. Okul yöneticileri veri kavramını rehber, bilgi kaynağı, durumsal tanılama aracı, gelişim izleme aracı ve tecrübe kavramları ile özdeşleştirmişlerdir. İkinci kategori *verinin işlevsel bilgiye dönüştürülmesi* kategorisidir. Kategori altında yer alan kodlar ise veri analizi, istişare, kıyaslama ve saha analizidir. Birinci tema altındaki üçüncü kategori *verinin yönetim süreçleri ile ilişkisi* kategorisidir. Okul yöneticileri veriyi hedef belirleme, karar, planlama, örgütleme, koordinasyon ve kontrol süreçleri ile ilişkilendirmişlerdir. Birinci tema altındaki son kategori *farklı veri türlerinin yönetsel süreçlerdeki işlevleri* kategorisidir. Kategori altında yer alan kodlar ise algı yönetimi, katılımcı yönetim, kurumsal performans göstergesi, tanılama ve yönlendirmedir.

Araştırmada ikinci tema *okul yöneticilerinin yararlandıkları veri türleri* temasıdır. Tema altında yer alan ilk kategori *okul yöneticilerinin yararlandıkları veri türleri* kategorisidir. Kategori altında yer alan kodlar akademik performans verileri, algı verileri, demografik veriler, öğretimsel veriler ve uygulama öncesi görüş verileridir. İkinci kategori *okul yöneticilerine göre en işlevsel veri türleri* kategorisidir. Kategori altında yer alan kodlar algı verileri, demografik veriler ve öğrenci akademik başarı verileridir. Tema altındaki son kategori ise okul yöneticilerinin veriden ne amaçla yararlandıkları kategorisidir. Okul yöneticileri veriden hesap verebilirlik, iyi uygulamaların yaygınlaştırılması, öğretimsel planlama, iletişim, risk analizi ve yönlendirme amaçlarıyla yararlandıklarını dile getirmişlerdir.

Araştırmada üçüncü tema *yönetsel karar süreçlerinde veriden nasıl yararlanıldığı* temasıdır. Tema altında yer alan ilk kategori *yönetsel karar süreçlerinde verinin işlevleri* kategorisidir. Kategori altında yer alan kodlar; karar yanılgıları ile mücadele, kararın benimsetilmesi, kararın gerekçelendirilmesi, karara katılımın sağlanması, örgütleme, operasyonel kararlar ve stratejik kararlardır. İkinci kategori olan *verinin yönetsel kararlara nasıl yön verdiği* kategorisi altında yer alan kodlar planlı değişim, çok boyutlu perspektif, vizyon-misyon oluşturma, karar kriterleri, seçenekler ve senaryolardır. Üçüncü kategori verinin kararların gerekçelendirilmesindeki işlevleridir. Bu kategori altında karar değişikliği, kararın güncellenmesi, rasyonel temel ve sürdürülebilirlik kodları yer almıştır.

Araştırmada dördüncü tema *okul yöneticilerinin yararlandıkları veri kaynaklarının işlevleri* temasıdır. Tema altında yer alan ilk kategori veri kaynaklarının yönetsel süreçlere katkıları kategorisidir. Kategori iki alt kategoriye ayrılarak incelenmiştir. İlk alt kategori *veri kaynaklarının veriden yararlanma hususundaki katkılarıdır.* Alt kategori altında okul

yöneticilerinin görüşleri etkin depolama ve yedekleme, kapsayıcılık, hız, gerçek zamanlı veri akışı, dikey-yatay bürokratik veri akışı ve erişilebilirlik olarak kodlanmıştır. İkinci alt kategori *veri kaynaklarının yönetsel işleyişe dönük katkılarıdır.* Alt kategori altında yer alan kodlar davranış yönetiminde ilişki analizi, risk yönetimi, süreç yönetimi, proje yönetimi, kestirim analizleri, makro düzey öğrenme analitiği, mesleki gelişim stratejisi, proje yönetimi ve eğitim yönetiminde dijital dönüşümdür. Tema altında yer alan ikinci kategori *e-Okul verilerinin yönetsel süreçlerdeki işlevleri* kategorisidir ve kategori altında yer alan kodlar gerçek zamanlı geri bildirim, güvenilir referans, mezo düzey öğrenme analitiği ve mikro düzey öğrenme analitiğidir. Tema altında yer alan son kategori EBA verilerinin yönetsel süreçlerdeki işlevleridir ve kategori altında eş zamanlı kontrol, geri bildirim kontrolü, kanıta dayalı öğrenme, mezo düzey öğrenme analitiği, mikro düzey öğrenme analitiği, bireyselleştirilmiş öğrenme ve sana öğrenme süreçlerinin geliştirilmesi kodlarına yer verilmiştir.

Araştırmada beşinci tema *okul yöneticilerinin veriden yararlanma noktasında karşılaştıkları sorunlardır.* Tema altında yer alan ilk kategori yöneticilerin okulda veriden yararlanma hususunda karşılaştıkları sorunlardır. Kategori altında büyük veri, dokümantasyon, veriye erişim, sahte korelasyon, senkronizasyon, süreksizlik, veri gizliliği, veri güvenilirliği, veri okuryazarlığı, büyük veriden değer yaratma ve yığın veri kodları yer almıştır. İkinci kategori olan *veriden yararlanma noktasında en temel sorun alanları* altında veri yönetimi, veri kültürü, üst veri ve ağ bağımlılığı ileri sürülmüştür. Son kategori olan *veriden yaralanma noktasında karşılaşılan sorunların çözüm yöntemleri* altında ileri sürülen önerilere ilişki kodlar makro düzey veri akışı, küçük veri, tam zamanlı mesai, veri analisti, veri okuryazarlığı eğitimi ve veri tabanlarında yenileşmedir.

Araştırmada *okulda veriye dayalı yönetim uygulamalarını daha etkili hale getirmek için öneriler* son tema olarak belirlenmiştir. Tema altındaki ilk kategori olan *yönetsel süreçleri veriye daya yönetsel süreçlere dönüştürmek için öneriler* kategorisi altında yer alan kodlar şu şekildedir; ulusal politika, durumsal liderlik, işlevsel arşivleme, kurumsal örgütlenme, etkin filtreleme, ölçek veri marketi, temsili deneyim, veri aktarımında otomasyon, veri ekosistemi ve veriye dayalı liderliktir. İkinci kategori ise *karar süreçlerini veriye dayalı karar süreçlerine dönüştürmek için önerileri* kapsamaktadır. Kategori altında yer alan kodlar istisnalarla yönetim, karar kuralı, veriye dayalı eylem gündemi, veriye dayalı karar destek mekanizmaları ve yetkilendirmedir. Son kategori ise planlama, örgütleme, eşgüdüm ve kontrol süreçlerini veriye dayalı bir forma dönüştürmek için öneriler kategorisidir. Kategori altında kurumsal karne, durumsal planlama, veriye dayalı entelektüel uyarım, kolektif çabaya yön birliği, veriye dayalı yönlendirme ve veriye dayalı kontrol kodları yer almıştır.

Okul yöneticileri veri kavramı ve yönetsel süreçlerdeki işlevlerine dönük sınırlı bir anlayışa sahiptirler. Veri okuryazarlığı eğitimi veri kavramı ve yönetsel süreçlerdeki işlevlerine dönük anlayışa katkı sunabilir. Eğitim yönetiminde yerelleşme yerel verinin okulda yönetsel süreçlere yansıtılmasında önemli bir rol oynayabilir. Kurumlar arası veri paylaşımına olanak sağlayacak tedbirler de veriye dayalı yönetsel süreçlere önemli katkılar sunabilir.