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Digital Transformation in Saudi Education:

The Role of School Canteen Services in

Enhancing the Student Experience

Housing

Retail

Education

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Overview of Digital Transformation in Education

Globally, education is witnessing a radical transformation towards digitization, driven by the technological development and the need for more flexible and effective teaching methods. This includes integrating modern technologies such as e-learning, smart classrooms and educational analytics to improve the quality of education and tailor the educational experience for each student. Globally, experience showed that the digital transformation contributes to providing greater opportunities to access to education, bridging the urban-rural gap and enhancing the digital skills of the students to meet future labor market demands

The Saudi Ministry of Education adopted ambitious strategies in Saudi Vision 2030, including the project of "Digital Transformation in Education" which focuses on

- developing technological infrastructure

- providing digital educational platforms

- linking educational systems with smart services allowing real-time performance monitoring and data analysis

This transformation involves all school facilities, such as classrooms and digital educational platforms, including canteens, through smart payment systems, digital inventory management and sales data analysis to support school health and improve resource management

Saudi Vision 2030's Digital Education-Related Objectives

Saudi Vision 2030 focuses on building a knowledge-based economy. Digital education is one of the key pillars for achieving this transformation. In its digital strategies, the Ministry of Education specified a set of key objectives intersecting with the Vision's objectives

Digital Education's Key Targets Supporting Vision's Objectives

01.

Improving quality of education and enhancing efficiency of educational outcomes by integrating modern technologies in the educational process, offering innovative teaching methods that keep pace with the global development

02.

Empowering fair and equitable access to education via digital platforms, ensuring that the educational services reach all areas, including remote ones, and bridging the city-village educational gap

03.

Enhancing the digital skills of students and teachers to prepare them for the future labor market, especially in the fields of technology, artificial intelligence and data analysis

04.

Achieving operational efficiency while managing schools by transitioning to smart administrative systems, including resource management, performance monitoring and real-time data analysis, which enhances decision-making efficiency

05.

Developing a comprehensive digital school environment covering all school services, such as school canteens, so that e-payment, tracking of purchases and assurance of food product quality can be applied by digital control systems

Landscape of Digital Transformation in Education in Saudi Arabia

The Saudi educational system witnessed remarkable digital development in the recent years. This is a part of Saudi Vision 2030's objectives stressing the importance of digital transformation across various sectors, including the education sector. Digital transformation in education is considered a key driver for improving quality and efficiency of educational process, by adopting modern technologies in schools and universities

Today, Saudi schools depend on a digital infrastructure that includes integrated electronic platforms and systems to support education and school administration. Below are the most significant platforms

01. Noor System

It is the Ministry of Education's unified educational administration system. It is used to manage the data of students and administrative processes (registration, grades, attendance, etc.). "Noor" serves more than 11.2 million users, including more than 6.5 million male and female students and about 500 thousand male and female teachers throughout the Kingdom, which makes it the digital backbone of public education administration

02. Madrasati Platform

It is a comprehensive e-learning platform launched by the Ministry of Education to provide students from all school grades with distance learning. "Madrasati" was widely used, especially during the COVID-19 pandemic, with about 5 million male and female students in addition to 420 thousand male and female public education teachers benefiting from it. This platform witnessed massive interaction during its early weeks of launch, as the Ministry detected more than 25 million visits to the platform, which increased to 41 million visits per day during the second day of the school year. This massive interaction enabled the uninterrupted continuity of distance learning, as hundreds of thousands of online homework's were done, and tens of thousands of synchronous virtual classrooms were daily provided to cover the whole curriculum

03. IEN Education Portal

It is a digital resource platform launched by the Ministry to enable students and teachers to access to a variety of online educational content. "IEN" Portal has an extensive library of interactive resources supporting curricula, including educational videos, games and enrichment activities. IEN platforms witnessed huge interest reflected by the fact that its educational channels reached about 100 million views of online educational content on YouTube during the distance learning period, reaffirming the role of digital content as an effective supplement to the in-person learning

This digital infrastructure resulted in actual improvements in the educational process. For example, a recent study conducted by the Ministry of Education indicated that the use of digital educational technologies and programs had a positive impact on student attainment, as students who regularly used digital platforms achieved better test results than those who did not. Further, distance learning tools expanded access to education across all areas, including remote ones, and ensured the continuity of learning in exceptional circumstances. This indicates that digital transformation became a key component in enhancing the quality of education and improving its outcomes in the Kingdom

Key Global Achievements of Digital Transformation in Education in Saudi Arabia

01.

Madrasati platform model was named as one of the top four global distance learning models by UNESCO

02.

UNESCO commended the National Center for e-Learning as a global model for quality control and assurance of digital solutions in education

03.

UNESCO documented Saudi Arabia's experience with distance education as part of four global practices alongside South Korea, China, and Finland

04.

The Saudi education ranked 30 in the scientific infrastructure hub globally in 2022

05.

World Bank commended e-learning in Saudi Arabia in a study entitled "Digital and Distance Learning in Saudi Arabia. Experiences from the COVID-19 Pandemic and Opportunities for Improving Education"

06.

Education in Saudi Arabia received two certificates of excellence at the World Summit on the Information Society (WSIS 2022), organized by the International Telecommunication Union in Geneva, Switzerland, entitled "Information and Communication Technologies for Well-being, Inclusion and Resilience". It received the two certificates for the project of "Madrasati Platform Testing System" developed by the Ministry of Education (access to information and knowledge category), and the project of "Business Development Support Center" developed by Princess Nourah bint Abdulrahman University (e-Science category)

Emerging Educational Technologies in Saudi Arabia

The education sector in Saudi Arabia is witnessing a qualitative leap in adoption of emerging educational technologies that contribute to developing the learning environment and improving its outcomes, in alignment with Saudi Vision 2030's objectives and digital transformation plans

These technologies vary to include

| artificial intelligence | smart attendance systems | digital payment solutions | behavioral monitoring and analysis tools |

that enhance quality and efficiency of educational process

Artificial intelligence in education

became a key tool for designing smart learning environments, as it is used to promptly analyze the students' data and make personalized recommendations considering individual differences. It contributes to fields such as

Adaptive learning

Predictive Learning

Monitoring each student's strengths and weaknesses

enabling teachers to adapt curricula and teaching methods according to actual needs, and helping improve level of academic attainment

Technologies of smart attendance

Technologies of smart attendance and parent communication depend on advanced digital systems, such as

fingerprint	facial recognition	QR codes

to accurately and swiftly record student attendance. These systems are connected to applications allowing to promptly notify parents once a case of absence or delay occurs, in addition to enabling them to monitor performance, activities and scheduling of meetings with teaching staff, enhancing partnership between school and family

Digital payment

in schools is a part of transformation towards non-monetary economy, as school fees and purchases are electronically paid via secure platforms such as SADAD, e-wallets and banking applications. This contributes to

simplifying transactions	enhancing level of financial transparency	improving efficiency of school resource management

with the ability to link financial data to administrative and educational systems

Behavioral monitoring and analysis tools

enable teachers and administrators to monitor and track student behaviors, such as

attendance

classroom engagement

compliance with classroom rules

participation in activities

These tools provide real-time reports and analyses that help with early intervention to tackle challenges, reinforce positive behavior through digital incentive programs and measure impact of educational initiatives.

Transformation in School Canteens in Saudi Arabia

School canteens in Saudi Arabia are important part of the learning environment, as they provide students with meals throughout the school day, and contribute to supporting their health and vitality. However, the landscape of these canteens reflects a clear disparity in level of service and quality between public, private and international schools. While canteens of public schools are characterized by their low prices and wide coverage, especially in villages and rural areas, the quality of products may be low in some cases

Operation of canteens is a sector with significant financial returns, as its annual sales estimated at about

1.5 billion Saudi riyals in 2018

Notwithstanding the foregoing, many canteens still serve meals that don't meet health standards, such as high-calorie and low-nutrition foods, while schools that adopted more stricter nutritional standards experienced improvements in the health and performance of their students

Recent years witnessed the emergence of specific initiatives to develop canteens, including introducing "smart canteen" systems depending on non-monetary payment and digital inventory management, which contributed to reducing waste and improving quality of food services provided to students

Canteen Sector Attractiveness for Operators

Operation of school canteens in Saudi Arabia is a field that attracts operators thanks to its large size and high annual returns. Statistics indicate that annual sales of canteens reach about SAR 1.5 billion, reflecting the strength of this sector and its ability to generate rewarding profits for investors. This attractiveness is further enhanced by the large number of public, private and international schools spread all over the Kingdom's areas, offering broad employment opportunities. The daily attendance of hundreds of students to the school environment ensures a stable consumer base, which makes the school canteen a sustainable project if it is managed in a professional manner meeting health standards and nutritional quality.

Illegal Operating Practices

Although there are regulations that govern operation of school canteens and stressing compliance with health and pricing requirements, some operators still commit violations with passive impacts on quality of service and student safety. The Ministry of Education detected cases of unauthorized products being sold, prices being raised above permitted rates and poor compliance with hygiene standards and proper food storage. The Ministry handles these violations by imposing financial penalties and obliging violating operators to promptly rectify their situation. Penalties may even include terminating contracts conducted with non-compliant parties, as part of its efforts to ensure a safe and healthy food environment within schools

Unhealthy Nutrition

Notwithstanding efforts to improve the quality of foods in school canteens, some schools still serve food products that don't meet the recommended health standards. These products include high-calorie, high-fat, high-sugar and low-nutrition meals, which may contribute to increasing rates of obesity and dietary diseases among students

These practices prompted widespread criticism from health experts and parents. Furthermore, the lack of effective control of food quality results in continually serving products that are harmful to student health, even when they could be replaced with healthier options such as fruits, vegetables and low-fat milk. In turn, the Ministry of Health recommended that canteens shall adhere to nutrition requirements that ensure students being served balanced meals covering their daily needs for essential nutrients, thus contributing to their physical and mental development

Differences between Public, Private and International Schools

Quality and operation of school canteens in Saudi Arabia differ depending on the type of school, reflecting the varying financial and administrative capabilities of each category

In **public schools**, prices of food products are often relatively low, making them affordable for most students. However, the quality and variety of meals may be limited, especially in rural areas and villages, due to weak operational resources or limited available options

For **private schools**, they tend to provide a wider and more varying food options, with the possibility of introducing imported or higher-quality products. However, this is reflected on prices that are often higher than those in public schools, and some canteens of private schools may face challenges in strict compliance with health standards if adequate control is not available

In contrast, international schools offer advanced canteen operating environments, both in terms of design and quality of service, while applying modern sales methods and high-quality food options. The high prices in these schools may be obstacle to the benefit of all students, and the canteen sometimes serves a specific segment of the school community

Challenges Facing School Canteens

Although the school canteens play a pivotal role in supporting school health and securing an integrated learning environment, many press reports and statements of competent authorities indicate that there are challenges hindering their optimal performance. They explained that poor nutritional awareness among some students and providing unhealthy products are obstacles to achieving the objectives of canteens to promote public health. On the other hand, Al-Madina newspaper pointed out that reliance on traditional operating systems reduces the efficiency of canteens, prompting some schools to adopt smart canteen models to overcome these obstacles and improve service quality

Unhealthy eating habits among some students represent a real challenge to school canteens, as many students prefer fast food and soft drinks over healthy foods, which negatively impacts on their health and vitality in the classrooms. Alwatan newspaper confirmed that this problem is compounded as there are no effective nutritional awareness programs engaging parents in the process of changing their children's behaviors

School and Educational Administration

School boards are experiencing difficulties in daily control of canteens, especially when depending on outsources for operation. According to what was published by Al-jazirah newspaper, some violations include unauthorized products being sold or non-compliance with storage and hygiene standards, which requires intensifying inspections and strengthening powers of health workers

Canteen Operators

Operators themselves are experiencing financial and operational constraints, especially given their obligation to provide high-quality healthy and affordable products, which may reduce profit margins. Al Eqtisadiah newspaper explains that the high prices of some foodstuffs present employers with a tough choice between reducing quality or raising prices, which could impact on student demand

Charitable and Supporting Associations

Charitable associations contribute to supporting school canteens by offering free meal or funding food programs for underprivileged students, but this support encounters obstacles to its sustainability and effectiveness. According to what was published by Alyaum newspaper, some of these associations operate with limited resources and depend on seasonal donations, which may limit their ability to reach every targeted student throughout the school year. Furthermore, the absence of unified digital mechanisms to track the allocation of support may result in failure to be optimally allocated

Canteen Development Opportunities in Saudi Arabia

The most significant opportunities for developing school canteens include enhancing the nutritional quality by introducing approved healthy menus, applying e-payment systems to reduce waste and control expenses, in addition to improving control via digital platforms, and launching smart food support programs that directly target underprivileged students

Healthy nutrition for students Improving nutritional value of meals served in canteens is a great opportunity to promote the health of students and boost their energy levels during the school day. The Ministry of Health recommends that school meals should contain balanced nutrients including proteins, fibers and vitamins, while reducing sugars and saturated fats to ensure healthier growth and better academic attainment

Expense management and waste reduction Adoption of e-payment systems within canteens, such as smart cards or applications contributes to managing expenses and accurately tracking spending, in addition to reducing risks of money loss or misuse. Furthermore, e-track of sales helps control inventory and reduce food waste by accurately predicting required quantities

Improvement of control and transparency Transformation towards digital canteen systems allows schools and educational departments to monitor performance in real-time, ensure that operators comply with health and pricing standards and issue accurate periodic reports on sales and traded products. This transparency boosts parental confidence and helps regulatory authorities make faster and more accurate decisions

Support of underprivileged students Modern technologies can make a significant difference in food support programs for low-income students via smart platforms allowing to allocate daily or weekly balances to eligible students and ensure that support directly reaches them without intermediaries. This method reduces waste and increases benefiting efficiently from the resources of

Digital Transformation in School Canteens

Digital transformation of school canteens is a strategic move to improve quality of food services, promote transparency and enhance student experience within the school. Adoption of e-order and e-payment systems allows students to easily and securely purchase their meals, enabling parents to track their children purchases in real-time. The smart canteens, which some Saudi schools started applying, also provide interactive healthy menus and use demand prediction and waste reduction data analysis-driven inventory management systems, in addition to facilitating control by school boards and stakeholders

This transformation contributes to increasing operational efficiency, improving work environment for operators and ensuring their compliance with health and pricing standards, making it a critical component in achieving Saudi Vision 2030's objectives towards integrated digital education

Digital transformation in school canteens is no longer considered a luxury, but rather a necessity dictated by operational and health challenges. Its main drivers include level of transparency, reducing food waste, improving student experience and enabling parents to track their daily purchases. This trend also aligns with Saudi Vision 2030's objectives in building a technological solution-based modern learning environment

Artificial intelligence technologies can play a pivotal role in developing canteens, by analyzing sales data to predict demand and proposing menus tailored to each school based on student preferences and health requirements. Technologies of facial recognition or smart cards can be adopted to accelerate purchases and ensure security of transactions

Global Digital Models

There are several successful global models that Saudi Arabia can benefit from, such as pre-ordering systems via applications in Finnish schools or non-monetary payment systems adopted in Japan, which link the student account to a smart card that he uses in canteen, library and means of transportation. These models proved to be effective in improving operational efficiency and promoting school health

Role of Technological Solutions in Improving Canteen Experience

Payment Facilitation and Expense Control

Adoption of e-payment systems in school canteens facilitated purchases and expense control, as it allows students to pay using smart cards or custom applications and enables parents to track purchases and set spending limits, reinforcing budgetary discipline and rationalizing consumption

Nutritional Value Improvement

Digital platforms play a role in improving nutrition quality by showing meal ingredients and nutritional values, helping students make healthier choices aligning with the Ministry of Health's guidelines for a balanced diet supporting growth and concentration

Promotion of Transparency and Accountability

Digital transformation in canteens enables administration to track sales and inventory in real-time, develop reports that detect violations and facilitate auditing, ensuring compliance with health and financial standards and promoting transparency and confidence

Facilitation of Student Support via Smart Platforms

Modern technologies enable associations and donors to allocate electronic food balances to underprivileged students, ensuring full access to support, reducing waste or misallocation, facilitating tracking of balances and ensuring their use for their intended purpose

Alignment with Financial Sector Development Program

Digital transformation in school canteens aligns with the objectives of Financial Sector Development Program, one of the programs intending to achieve Saudi Vision 2030, by promoting the use of e-payment methods, enhancing spending efficiency and extending financial inclusion in learning environment, contributing to instilling well-disciplined financial behavior in younger generations

Case Study:
Waki Application

واكي
WAKI

Waki application is a Saudi platform specialized in automating purchases within school canteens. It aims to improve experiences of students, parents and schools via e-payment, expense control and menu display via a smart application

This trend aligns with Saudi Vision 2030 for digital transformation in education sector, which stresses the integration of technology into educational services to enhance efficiency and transparency

How Waki Application Works

Waki application depends on linking the student account to a parent-managed e-wallet. This allows student to top up balance, control daily expenses and block purchasing some products. Student can choose his meal from a digital menu, pay via online application, then directly pick up his order from the canteen, reducing congestion and eliminating monetary transactions

Available Means of Payment and Support

WAKI واكي

Paying via the application's e-wallet

Topping up balance using bank cards

Many payment options available in school canteen, such as cards, bracelets, face IDs and QR codes, allowing to freely choose a suitable method of purchase

Ability to receive financial support from schools or charitable associations by topping up direct balance to the student's system-embedded account

Student can purchase either by going directly to the point of sale or by self-ordering machines that allow him to browse products, pay in advance and then pick up his order from the point of sale, contributing to reducing congestion during break time

Values Added to

Schools

- Real-time and accurate financial reports
- Significantly reducing waste in the canteen

Operators

- Increasing sales due to the ability to accept credit card payments, expanding payment options to include students and off-campus visitors who use e-wallets, facilitating purchases for everyone

Students

- Picking up orders faster and reducing waiting time
- Displaying clear nutritional information before purchasing

Parents

- Ability to track all purchases in real-time
- Controlling expenses and eliminating unwanted products

Statistics from Waki Data By type of city

Riyadh

%46.76	2.45	5.24
Participation Rate	Spending per Student	Average Ticket Size

Jeddah

%43.54	1.82	4.18
Participation Rate	Spending per Student	Average Ticket Size

Eastern Province

%43.46	1.96	4.51
Participation Rate	Spending per Student	Average Ticket Size

Statistics from Waki Data By type of school

Public

%58.54	1.20	2.05
Participation Rate	Spending per Student	Average Ticket Size

Private

%43.90	1.87	4.26
Participation Rate	Spending per Student	Average Ticket Size

International

%49.37	3.94	7.98
Participation Rate	Spending per Student	Average Ticket Size

Statistics from Waki Data By grade level

Primary

%52.16	⌗ 1.45	⌗ 2.78
Participation Rate	Spending per Student	Average Ticket Size

Intermediate

%43.03	⌗ 2.10	⌗ 4.88
Participation Rate	Spending per Student	Average Ticket Size

Secondary

%9.09	⌗ 0.60	⌗ 6.60
Participation Rate	Spending per Student	Average Ticket Size

Statistics from Waki Data By gender

Male

%33.17	⌗ 1.32	⌗ 3.98
Participation Rate	Spending per Student	Average Ticket Size

Female

%35.54	⌗ 1.66	⌗ 4.67
Participation Rate	Spending per Student	Average Ticket Size

Average Ticket Size

It is the average amount paid by student in each purchase from canteen

Spending per Student

It is the total sales divided by the total number of students. It represents the average sales achieved by each student during a specific period. It is often less than the average purchase value, as there are students who do not purchase from canteen or bring their meals from home

Data showed that student engagement rate in purchasing from canteens varies across areas, as Riyadh recorded the highest engagement rate at 46.76%, followed by Jeddah at 43.54%, and Eastern Province at 43.46%. Ticket price (the average amount spent by a single buyer per visit) in Riyadh was SAR 5.24, in Jeddah SAR 4.18 and in Eastern Province SAR 4.51. Average spending per student (including non-buyers) was SAR 2.45 riyals in Riyadh, SAR 1.82 in Jeddah and SAR 1.96 in Eastern Province. These figures point out that there is a clear gap between purchasing power and engagement levels, which opens the way for pricing and offering strategies aimed to increase engagement in less active cities. Comparison shows that Riyadh leads in terms of engagement rate and ticket price, which may reflect that there are more attractive or student-friendly options, or that they have successful strategies of sales and promotions there. In contrast, the rates in Jeddah and Eastern Province point out that it is required to reconsider product diversity and pricing to encourage purchases, especially given that ticket prices in Eastern Province are higher than in Jeddah, despite similar engagement rates.

Impact of Digital Transformation on Educational Community

Financial and Administrative Impact

Digital transformation in school canteens made a qualitative leap in their management and operation, by introducing sales and e-payment smart systems that limited monetary transactions, thereby reducing financial loss and any manipulation of returns. These systems allow schools and operators to track sales in real-time via digital dashboards, identify most ordered products and peak times, along with facilitating accurate and rapid financial reporting, promoting transparency and accountability. Administrative automation also contributes to reducing operational costs by reducing reliance on employees for routine tasks and improving inventory management by data-driven ordering, which reduces waste and increases profitability

Impact on Student Behavior and Financial Awareness

Introduction of e-payment in school canteens was not just a technical step, but also an educational tool, as linking a student card to a parent's account allows to track purchases, guide purchasing behavior and instill principles of money management and mindful spending. Families can set limits for their spending and eliminating unhealthy products, which enhances students' financial and nutritional awareness and reducing amount of cash they carry, increasing school safety. Accordingly, digital transformation became a method to accelerate purchasing and create a generation more aware of dealing with money and food

Impact on Nutrition Quality

Quality of food in school canteens has long stirred up controversy, with many meals lacking proper nutritional standards and containing high levels of fats, sugars and preservatives, all of which can harm students' long-term health. Digital transformation contributed to improving this ecosystem by enabling schools to adopt healthy menus, accurately control their implementation, track daily sales of products and eliminate non-conforming ones. Pre-ordering systems and smart menus also provide more balanced meals rich in essential nutrients, which supports students' vitality and ability to concentrate, in conformity with the Ministry of Health's approach to promote healthy food and maintain an ideal weight

Recommendations

Schools and Education Departments

Applying digital sales and payment systems It is recommended that e-payment systems be adopted in school canteens to facilitate purchases, reduce cash handling and improve control over returns

Improving quality of foods served to students Constantly rechecking menus, while complying with the Ministry of Health's standards to ensure that healthy and safe meals promoting students' physical and mental development are served

Promoting financial awareness of students Integrating awareness programs into school activities to teach students how to manage their school expenses, linking this to daily practices in canteens

Technology Startups

Innovating technical solutions for canteen management Developing applications allowing students and parents to pre-order and pay for meals electronically, with the ability to customize meals based on nutritional needs

Analyzing purchase data to improve services Benefiting from data analysis techniques to identify student consumption patterns and propose .improvements increasing sales and service quality

Governmental and Regulatory Authorities

Updating and applying canteen operating regulations Periodically reconsidering laws and regulations, prohibiting selling harmful or unhealthy products within schools and imposing severe penalties on violators

Launching national awareness campaigns Launching awareness information campaigns targeting students and parents about importance of proper nutrition and its impact on academic attainment and public health

Non-profit Sector

Implementing nutritional awareness programs in cooperation with schools Holding awareness workshops and lectures aimed to instill healthy eating habits in souls of students

Contributing to funding development projects Supporting canteen development projects and equipping them with modern technologies contributing to improving purchase experience and quality of meals served

References

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