



Calhoun: The NPS Institutional Archive
DSpace Repository

Faculty and Researchers

Faculty and Researchers' Publications

2022-05-02

An Internet of Things (IoT) Based Approach to Innovate Canteen Stores Departments Retail Operations

Rashid, Hafiz; Kamal, Kashif; Leghari, Sohaib

<http://hdl.handle.net/10945/70335>

This publication is a work of the U.S. Government as defined in Title 17, United States Code, Section 101. Copyright protection is not available for this work in the United States.

Downloaded from NPS Archive: Calhoun



Calhoun is the Naval Postgraduate School's public access digital repository for research materials and institutional publications created by the NPS community. Calhoun is named for Professor of Mathematics Guy K. Calhoun, NPS's first appointed -- and published -- scholarly author.

Dudley Knox Library / Naval Postgraduate School
411 Dyer Road / 1 University Circle
Monterey, California USA 93943

<http://www.nps.edu/library>

An Internet of Things (IoT) Based Approach to Innovate Canteen Stores Department's Retail Operations

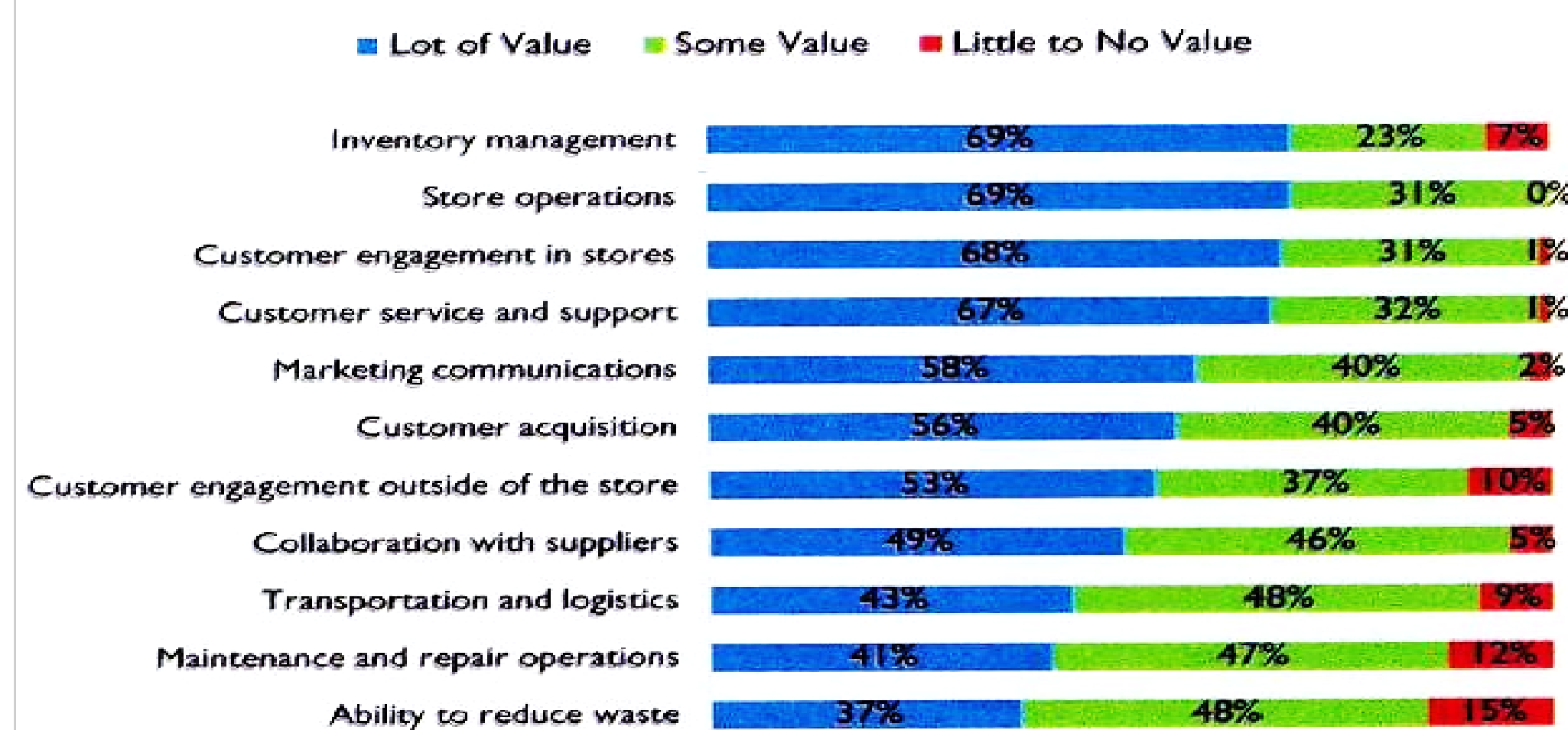


NAVAL
POSTGRADUATE
SCHOOL

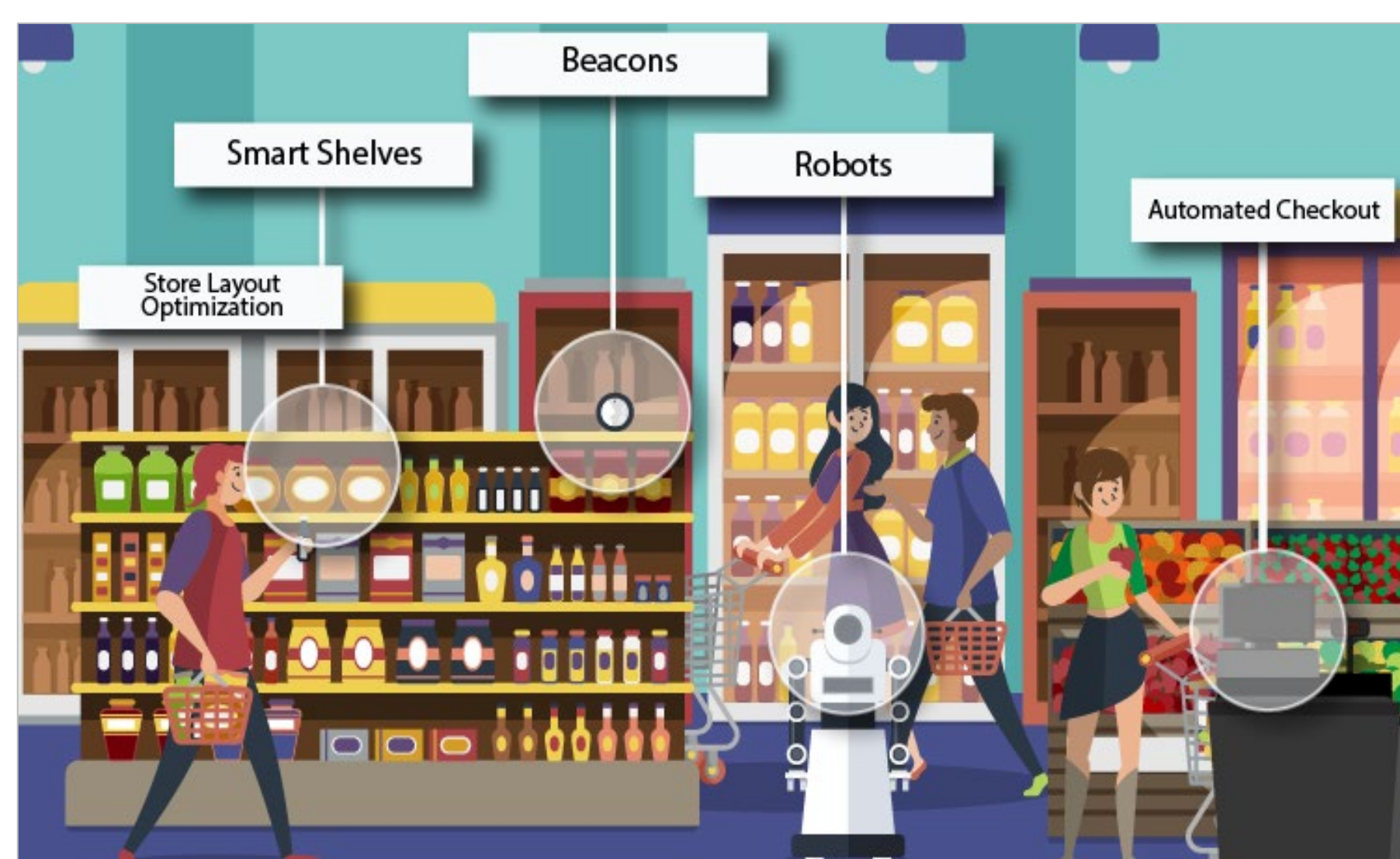
Abstract

In the arena of globalization and competitive business environments, there is an emergent need for retail organizations to capitalize on technological tools and solutions. Retailers that adopt Internet of Things (IoT) technologies improve customer experiences and achieve cost savings. In this regard, the Pakistani-based retail chain Canteen Stores Department (CSD) can use IoT technologies to enhance its competitive advantage. This study aims to create a deeper understanding of how CSD retail operations can use IoT technologies to significantly modernize and improve CSD's business offerings.

Impact From Deploying Internet of Things Solutions



Source: Kilcourse, B., & Rowen, S. (2016). The Internet Of Things In Retail: Getting Beyond The Hype. *Retail Systems Research*. <https://www.rsresearch.com/research/the-internet-of-things-in-retail-getting-beyond-the-hype>



Source: 42Gears Team. (2019, May 16). How IoT is changing retail industry. *42Gears Mobility Systems*. <https://www.42gears.com/blog/how-iot-is-changing-retail-industry/>

Methods

- Descriptive research with qualitative analysis of the data collected from primary and secondary sources.
- Primary information collected through personal communication with CSD's management, customers, and suppliers.
- Discussions conducted online via video/voice calls in November 2021.
- Secondary data collected from research journals, news articles, books, reports, research articles, web pages, blog posts, and conference papers.

Results & Their Impact

- Adoption of all or a few IoT applications at the CSD store located at Rawalpindi will entirely transform CSD's operations.
- The study has suggested the IoT technologies for CSD that will:
 - Optimize store layout and in-store promotion
 - Enhance customer experience through in-store mapping on a mobile application, automated checkout system, smart customer relationship management
 - Save time and resources through digital price tagging, smart shelving, and modernized distribution, transportation, and warehousing.

IoT Based	Ease of Shopping	Product Availability	Marketing	Data Analytics	Cost Savings	Existing Application
Store Layout	✗		✗	✗	✗	Euclid, ShopperTrak, Aurora
Automated Checkout	✗			✗	✗	MagicBand, Verifone, Beanstore POS
Store Mapping	✗		✗	✗	✗	SmartMart, Linea Pro-4
Smart Shelves	✗	✗		✗	✗	Kaa Power Shelf
In-Store Promotions	✗	✗	✗	✗		iBeacon VMware
Digital Price Tagging	✗		✗		✗	Electronic Shelf Labels (Pricer, n.d.)
Smart CRM	✗	✗	✗	✗	✗	Combination of almost all above-mentioned technologies
Robotics Warehouse and Distribution	✗	✗	✗	✗	✗	Kiva (Yudiansyah et al., 2020), ORION (Holland et al., 2017)

Existing IoT Applications.

Adapted from: Bok, B. G. J. (2016). Innovating the retail industry: An IoT approach [Bachelor's thesis, University of Twente]. <http://essay.utwente.nl/69982/>

Recommendations

- CSD may carry out a detailed technical study on each IoT application through IT experts and professionals to generate a detailed report on the technical feasibility of integration, implementation, and associated costs to develop and maintain IoT applications' infrastructure.
- This study offers management guidance to Pakistani retailers in implementing IoT technologies into their retail operations.
- Future researchers can study IoT applications in other retail domains like clothing, electronic items, furniture, and automotive.

