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IMPROVEMENT OF EXPANDED POLYSTRENE BARCODE SYSTEM AT PT KEMASAN CIPTATAMA SEMPURNA

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Abstract

This research focuses on improving the barcode system at PT Kemasan Ciptatama Sempurna by integrating Internet of Things (IoT) technology and a MySQL database. The aim is to enhance inventory management and goods delivery efficiency. The research method used is Research and Development (R&D) to develop and test the proposed system. The highest sales products were identified as HMD001, HMD002, POT001, and POT002, while low sales items remained consistent, including item codes BOX001, BOX002, LBR001, and LBR002. The implementation of the barcode system integrated with a MySQL database resulted in reduced delivery lead times, optimized inventory management, real-time tracking of goods, decreased recording errors, and improved operational efficiency. Furthermore, the use of IoT in the barcode system provides additional benefits such as goods condition monitoring and automated inventory processes.

Keywords: Research and Developmentr, Internet of Things, Mysql, Inventory Management, Barcode System

INTRODUCTION

The development of technology today has a positive impact on company activities. Almost all fields of technology produce innovations, and technology has become a common need in companies. The need for technology is clearly felt with its benefits in various areas of the company. Technological updates encourage all parties to integrate technology in daily activities for the company's future success. The transformation from conventional technology to advanced technology facilitates company activities. Some technologies such as Artificial Intelligence, Internet of Things, and robots are widely used because of their smart and sophisticated capabilities, even considered capable of matching humans.

In this modern era of digitalization, companies are competing to adopt smart technologies, such as the Internet of Things, which are considered to improve operational efficiency. The Internet of Things allows companies to control various aspects of their business, including inventory management, shipment tracking, and fuel and parts management. IoT also provides business opportunities by creating a network of physical devices that connect to the internet, communicate, and exchange data with each other.

The Internet of Things allows companies to control various aspects of their business, including inventory management, shipment tracking, and fuel and parts management. IoT also provides business opportunities by creating a network of physical devices that connect to the internet, communicate, and exchange data with each other. According to Awaludin & Amelia (2022), the Internet of Things is a concept to extend the benefits of continuous internet connectivity.

The development of Internet of Things (IoT) devices has a significant impact on the integration

of barcode technology. Today's technological advancements simplify the process of inventory data collection. For example, the use of barcodes to identify goods makes this process much faster and more efficient, and reduces the possibility of recording errors. However, despite being considered efficient and effective, The Companies, which is engaged in raw materials, experienced several obstacles. One of them is the barcode data that does not enter the database system because the data tracking is not connected to the product database that contains detailed information.

Research conducted by Prasetyo (2020) barcode technology with the Research and Development method produces a final product in the form of a prototype with a method of making labeling using barcodes for the inventory process of goods, this application is made using a database. The results of this study have been tested in the field in validation and stated to meet the expected objectives and the results of the inventory of goods can be faster and more accurate.

One of the primary challenges in the Internet of Things is the strategies, tools, processes, systems, and methods used to protect all aspects of the Internet of Things**.** Internet of Things security can be disrupted due to the many weaknesses that are regularly discovered in IoT systems. Strong IoT security covers all aspects of protection, including component hardening, monitoring, firmware updates, access management, threat response, and vulnerability recovery. IoT security is critical because these systems are dispersed and vulnerable, making them highly targeted attack vectors. Securing IoT devices from unauthorized access ensures that they do not become gateways to other parts of the network or leak sensitive information.

METHOD

The method used in this research is quantitative. This quantitative method aims to determine the role of the independent variable on the dependent variable. While the approach used is an associative descriptive approach. According to Borg & Gall dalam Ratri (2021) Research and development is a development model aimed at designing new products or procedures. The product is systematically field tested, evaluated, and then improved to achieve the expected effectiveness, quality, or standards.

On the Survey of Test Methods and Testbed Development About the Internet of Things... This paper summarizes the latest test methods of various IoT fields and discusses the current status of IoT testing. The findings show that IoT testing will become larger and smarter, and testing will undergo standardization with a focus on multi-technology.

RESULTS AND DISCUSSION

1. Initial Raw Materials Product Data

Initial Raw Material Product Data is obtained to see the stock (in) from production to the warehouse, this data is to help and monitor the management of raw material inventory more

effectively.

Table 2 Initial Raw Materials Product Data

Description	Raw Material Stock (in)
BOX	111.745
MLD	316.372
HMD	72.668
POT	4.348
LBR	54.329

Sources: Company Data

The product with the highest stock of MLD with 316,372 units, indicating this category has a very high demand or need for raw materials. And the product with the lowest stock POT with 4,348 units, indicating a low demand or need for raw materials for this category.

2. Final Product Raw Material Data

Based on the final product raw material table that shows the outgoing stock from the warehouse to consumers, this data provides information about the number of raw materials that have been sent.

Table 2 Final Product Raw Material Data

Description	Raw Final Product (out)
BOX	98.238
MLD	353.849
HMD	66.812
POT	6.579
LBR	36.161

Sources: Company Data

This data is very important for companies to manage raw materials coming out of the warehouse, by looking at the highest raw material data for MLD products with 353,849 units and POT products with 6,579 units.

3. Raw Materials Sales Data

This raw material sales data is used to determine the number of items sold so as to reduce the risk of running out of stock.

Table 3 Raw Materials Sales Data

Description	Sales Raw Materials
BOX	176.228
MLD	629.017

HMD	232.105
POT	66.675
LBR	249.766

Sources: Company Data

This data is very important for companies to understand sales trends and consumer preferences. By knowing the number of sales per category, with the MLD Category with 629,017 units, showing that molded products are very popular among consumers. and the POT Category with 66,675 units, showing that pottery products have a smaller or specific market.

Data Analyst

At the problem identification stage with the Research and Development method, there are problems that must be solved to develop effective and innovative solutions, it was found that the item code BOX003 did not appear in the system because it was not connected to the product that contained the details.

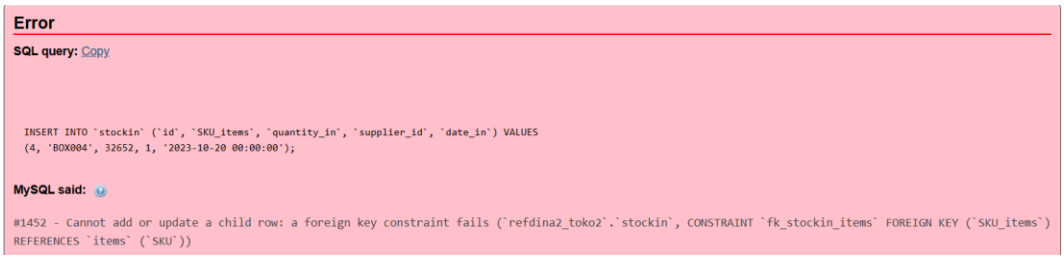

Figure 1 Data Analyst

Sources: MySQL Database

System testing is done by entering items into the mysql database via SKU (derived from barcode scanner / manual input), Quantity_in (number of items entered), Date_in (date the item entered), Supplier_id (id of the supplier who entered the goods). This analysis was carried out using a new database to correct errors that occurred in the previous database, this repair was carried out using the MYSQL database.

At this stage, development and testing are carried out in order to store data and develop a user interface (UI) and backend to manage data in the supplier table with MYSQL implementation.

```
INSERT INTO `supplier` (`id`, `name`, `phone`, `address`, `city`)
VALUES
  (1, 'Pabrik 1', '086526489784', 'Jl. AAAA', 'Cikarang'),
  (2, 'Pabrik 2', '089568497899', 'Jl. BBBB', 'Cileunyi'),
  (3, 'Pasar 1', NULL, NULL, NULL),
  (4, 'Retur', NULL, NULL, NULL)
```

Figure 2 MYSQL implementation

Sources: MySQL Database

This data shows how the System in phpMyAdmin is used to manage MySQL databases. Each table in the database is displayed with the various actions that can be performed, as well as information about the number of rows, table type, sorting rules, table size, and overhead space.

```
SELECT
        stockin.id,
        items.SKU,
        categories.category,
        items.item,
        items.model,
        stockin.quantity_in,
        stockin.date_in,
        supplier.name
FROM
      stockin
LEFT JOIN
       items
ON stockin.SKU_items=items.SKU
LEFT JOIN
       categories
ON items.category_id = categories.id
LEFT JOIN
       supplier
ON stockin.supplier_id=supplier.id
ORDER BY
       stockin.date_in DESC
```

Figure 3 Data shows how the System

Sources: MySQL Database

System testing is done by enter. stock in is created in order to join the stockin table with the items table based on item SKU. Using 'left join' ensures all entries in stockin are included.ing item items into the mysql database through SKU, Quantity_in, Date_in, Supplier_id.

Table 4 System testing is done by enter

Category	Balance	Total In	Total Out	Total Sold	Final Balance
BOX	111745	163746	6935	176228	92328
HMD	72668	183789	0	232105	24352
LBR	54329	250477	5364	249766	49764
MDL	316372	658744	24528	629017	321571
POT	4348	71444	61	66675	9056

Sources: MySQL Database

As the results, From the data above, it can be seen that all categories have significant stock movements. The category with the largest intake is MDL (658,744 units), while the largest sales also occur in the MDL category (629,017 units). However, the BOX, HMD, LBR, and POT categories also showed significant stock dynamics, with BOX and HMD having high sales. Effective stock management is evident from the available ending balance in each category, reflecting the balance between income, expenses, and sales.

Table 5 Effective stock management is evident

Category	SKU Items	Qty Ordered
MLD	MLD001	248187
MLD	MLD002	165458
LBR	LBR001	138322
BOX	BOX001	104080
LBR	LBR002	92216
BOX	BOX002	69387
HMD	HMD001	68526
HMD	HMD002	45685
POT	POT001	25401
POT	POT002	16934

Sources: MySQL Database

In this data count calculates the number of items ordered (qty_ordered) for each SKU item per month from the sales table, then combines it with the items and categories tables to get product categories. The result displays the category, item SKU, and number of items ordered for December, sorted by qty_ordered in descending order. It is known that product MLD001 has the highest number of orders with a total of 248,187 units. This indicates that this product is very popular or has a very high demand.

Table 6 This indicates that this product is very popular or has a very high demand

Category	SKU Items	Min Ordered	Max Ordered	Avg Ordered	Std Ordered	Koef Vairasi
MLD	MLD001	248187	377410	314986,67	52845,75	16,78
MLD	MLD002	165458	251607	209991,33	35230,64	16,78
LBR	LBR001	138322	149859	145084,67	4915,33	3,39
BOX	BOX001	98766	105736	102860,67	2973,25	2,89
LBR	LBR002	92216	99907	96724,33	3276,78	3,39
HMD	HMD001	68526	139263	95397,33	31278,71	32,79
BOX	BOX002	65845	70492	68574,67	1982,18	2,89
HMD	HMD002	45685	92842	63599	20851,94	32,79
POT	POT001	25401	47935	37780,33	9332,99	24,70
POT	POT002	16934	31957	25187	6222,17	24,70

Sources: MySQL Database

The data above is a benchmark for the Company to allocate minimum stock. With max_ordered data is the maximum number of orders/purchases in a month Being a benchmark for the company to allocate maximum stock shows sales statistics for three months (October, November, December) 2023. Standard deviation measures monthly variation, giving an idea of sales consistency. A high Coefficient of Variation percentage indicates a large variation in ordering, such as item codes HMD001, HMD002, POT001, and POT002 (32%), while a low one indicates consistency, such as item codes BOX001, BOX002, LBR001, and LBR002 (3%). This variability gives an idea of how consistent or variable product sales are each month.

CONCLUSION

This research makes an important contribution to the company in data processing using MySQL. Based on data processing with the Research and Development (R&D) method and MySQL implementation, this research provides a complete picture of inventory management and calculation. This research helps companies manage inventory effectively and efficiently, ensuring smooth operations and better decision making based on accurate and organized data with 32% a large variation in ordering.

REFERENCES

Daudi Alwi, S. M. (2024). Pengembangan Aplikasi Trainer Pengukuran Listrik Berbasis IOT Pada Praktikum Metode Pengukuran . *Educator Development Journal* , Vol 2, No.1 .

Deby Siska Bogar, W. W. (2022). Penerapan Barcode Pada Perancangan Sistem. *Teknologi dan Rekayasa*, Vol.7, No.2.

Erman Arif, E. J. (2023). Penerapan Konsep Internet of Things pada Pengembangan Aplikasi . *Technomedia Journal*, Vol.7 No.3.

Marta Atik S, Z. P. (2023). Pengembangan Sistem Kelas Cerdas Berbasis Internet of Things . *Informatic Technology And Communication*, Vol 7, No.1.

Mia Wimala, K. I. (2022). Perkembangan Internet of Things di Industri Konstruksi . *Sustainable Construction*, Vol.1, No.2.

Ni'matul Ma'muriyah, L. (2023). Perancangan Program Database Excel dengan Input Barcode Scanner di . *Pengabdian Kepada Masyaraka*, Vol.1, No.4.

Okpatrioka. (2023). Research And Development (R&D) Penelitian Yang Inovatif Dalam . *Pendidikan, Bahasa dan Budaya*, Vol.1, No.1 .

Qomarul Huda, H. F. (2022). Prototype Sistem Abesensi Menggunakan RFID Berbasis IOT . *Publikasi Ilmu Komputer dan Multimedia*, Vol.1 No.1.

Rusito, D. M. (2023). Sistem Monitoring Hasil Pemanenan Madu Berbasis IoT . *Ilmiah Elektronika dan Komputer*, Vol.16, No.1.

Shicheng Zhu, S. Y. (2022). Survey of Testing Methods and Testbed Development . *Wireless Personal Communication*, 123:165-194.

Titin Wahyuni, R. Y. (2022). Pengembangan Media Trainer Internet Of Things . *Informatika Sains dan Teknologi*, Vol 7, No.1.

Wu, S. (2023). Research on innovation and development of university instructional. *Soft Computing*, 27:19075-19094.

Imron Rosadi et al (2023). Pengembangan Sistem Informasi Pengelolaan Laboratorium (SIMPAL) Dengan Penambahan *Barcode Scanner*. Integrated Lab Journal. Vol. 11, No. 02

Dolly H. Manik et al (2023). Penerapan *Internet of Things* Pada Sistem Monitoring Pemakaian Daya Listrik Rumah Tangga Berbasis Mikrokontroler dan Website. Sigma Teknika, Vol. 4, No.2: 255-261.