Bridging the Gap between ERP Applications and eCommerce Solutions

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Abstract: In today's world, ERP (Enterprise Resource Planning) applications have become a solution better than any other traditional way to approach the enterprise level sustainability within a department/organization. The area where ERP becomes difficult to use is the part where integration between other platforms such as e-commerce platforms is required. It is really hard to find an off the shelf solution to integrate the ERPs with the POS (Point of Sales) ecommerce since both the platforms follow different functional rules and process flows in terms of used terminologies and the business processes.

To solve this problem this paper focuses on proposing a solution for aligning both ends that is the Ecommerce platforms as well as the ERP side while staying within their business processes.

Key words: Dynamix AX, enterprise resource planning, point of sales,magento.

1. Introduction

In the modern dynamic business environment organizational efficiency and effective management, much depends on well-integrated business process. As a result, Enterprise applications have gained much popularity. At the same time penetration of online activities in the modern day life have given way to online businesses. Thus organizations not only need to have integrated enterprise applications to manage their internal process but also need to integrate external supplier and customer side process as well [1].

For internal management of process organizations use ERP (Enterprise resource Planning) application and for eCommerce solutions separate applications are being used. The problem arises when data captured through the eCommerce platforms is needed to be integrated with the ERP data.

Organizations using E-commerce and ERP for maintaining their sales and management need to synchronize both ends to maintain system sustainability and real-time credibility [2]. To make these synchronizations possible these organizations hire resources to manually feed data at both ends to maintain the equal level of information available at both the ends, but the difference in processes and terminologies makes it difficult replicate the understanding of information at both ends.

This paper proposes a solution to solve this problem by improving convenience and efficiency and reduce chances of errors that used to occur when manually transporting data from eCommerce platform to the ERP applications.

2. Need to Allign e-Commerce Process with Enterprise Resource Planning Business Process

With the growth of enterprise applications and penetration of online businesses trends organizations need to not only focus on having all internal process streamlined but also need to align the online business process with internal management process. Businesses on one hand need to maintain their online point of sales systems and on the other hand need to cater the integration and synchronization among internal business processes that are playing an important role to strengthen the business in terms of finance, HR (human resource), marketing, manufacturing and procurement. Departments at any point need to know the statuses of where the business stands in terms of its sales progress to stay ready for the upcoming needs. As business processes no longer work in isolation organizations, implement ERPs to manage the cross-functional business environment. At the same time, organizations also need to manage and integrate the point of sales in the e-commerce website through which they reach their customers. Therefore, the need is to have an alignment among the organizational business processes and the point of sales.

Years of research and time have been invested in traditional ERP solutions to develop at state of art where they currently are able to manage large organization. But these ERPs when in development stage were not able to envision the explosive growth of eCommerce. ERPs were more focused on managing internal organizational processes and resources but the customer end lagged behind [3]. In the modern eCommerce era processes like customer services, personalized orders, on demand production and many such processes and quite new to the traditional ERPs Whereas the eCommerce platforms are focused towards customer centric services. Now the need is to have both ends meet and have a complete solution.

One way to do so is to have the eCommerce solutions imbedded in the ERP solutions. Business would need to analyze the organizations needs, assign resources, identify factors that would play a role, define a strategy for such development & implementation for solution. [4,5]. This is not only a very costly solution but also would take time to implement.

Another solution to the problem is manual input of data from one platform to another. This is the way most organizations are currently managing their systems and data between both platforms. This approach can work for small organizations having limited daily transitions hence limited data to manually feed into the system. In case of big amount of daily orders of sales to process this manual process does not work.

Some organizations have come up with a solution to automate the process of synchronization but such cases handle this by mapping databases. This again has its demerits. It is to be understood the mapping and the synchronization of the data may be at some be the priority but to achieve maximum success the process of the both the system should be brought close enough to make the synchronization of data meaningful.

3. Proposed Solution

Based on the problems discussed so far it is quite evident that the current practices of synchronization of ERPs and eCommerce platforms are inefficient. Fig. 1 & 2 shows the current practices in general and the proposed solution.

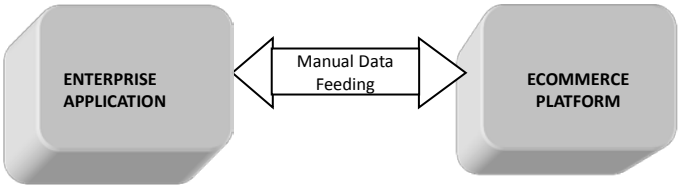

Fig. 1. Current practices.

The need is to have a cost effective, efficient and easy to implement solution to integrate the ERP systems and the eCommerce platforms. The proposed solution is to develop a a middle-ware connector to integrate

both platforms. This connector would map the current ERP processes with the process of available with eCommerce solutions being used by organizations. Web-services can be used as APIs to avail REST and SOAP services for the sake of synchronization and data accessibility from the E-commerce platform and ERP.

Once the process are mapped then synchronizations and movement of data can be automatically managed without any hassle and at the same time errors in data transfer would be minimized.

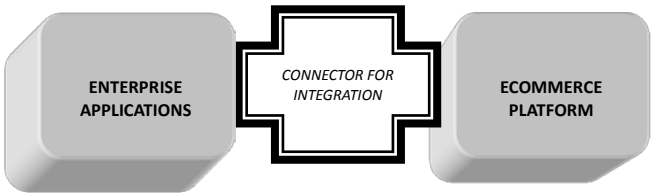

Fig. 2. Proposed solution.

In order to further discuss the proposed solution as to how the mapping of process can be carried out the authors selected an ERP application and an eCommerce platform as an example to discuss the mapping and integration process.

4. Units Platform Selected the for the Study

There are many ERP applications that are currently being used by organizations and at the same time several eCommerce platforms are also available for organizations. Each ERP solution have their own business process and same is the case with the eCommerce solutions. Mapping all available ERPs and eCommerce solutions would have become too lengthy process and out of scope for this study. Secondly, this research is not about knowing the variety of operations and functionalities of various platforms but to understand and justify the possibilities of the idea to align Point of Sales(e-Commerce) and ERPs together for the sake of data synchronization and integrity.

For this study any ERP or eCommerce solution could have been selected but for the study discussed in this paper an ERP solution provided by Microsoft that is Dynamic AX has been selected. The reason for selecting this ERP solution was that Dynamic AX was being used in many organizations in the country where this study was being carried out. For the eCommerce platform, Magento was selected and the reason for selecting this application was the same as the case of ERP.

Added to this, one more reason to consider Microsoft Dynamics AX is that it is one of the top 5 ERP solution being implemented globally [6]

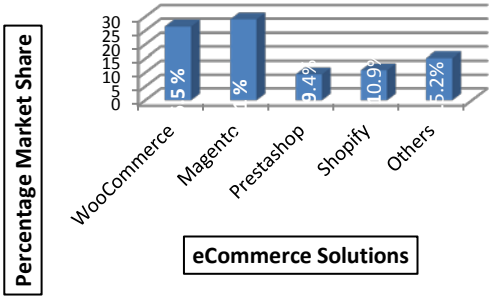

Fig. 3. Market share of some common ecommerce platforms [7].

Magento also enjoys a higher market share that falls under top positions among global ratings by users. Various studies have been conducted to verify this statement [8], for example according to a study

conducted in March 2016 by aheadworks, Magento enjoys a total market share of 29.1% percent. Fig. 3 shows the this statistics and comparison of other eCommerce platforms.

5. Areas of Alignment

In order to align the ERP Solutions and the eCommerce platform it is important to first identify the areas that need to be aligned and figure out the differences between both the platforms.

The two major process where ERPs and eCommerce platform need to communicate and share data are:

- Sales Order Management
- Inventory Control

For this research both these process have been thoroughly studied to understand the individual processes. Next the differences between both platforms where integration is required were highlighted. After the thorough study of both the platforms, finally they are compared based on following parameters.

- Comparisons of Functionalities
- Comparison of Terminologies
- Comparison of web-services

6. Comparison of Functionalities

6.1. Sales Order

The sales order process in Dynamics AX ERP involves various steps. These steps are summarized in nine steps that are shown in Fig. 4 and explained further.

Step1 : Open Sales Order

In the first step the window of sales order is opened and this is the place where previous sales orders can be viewed.

Step2 : Click Sales Order

Here the any sales order can be clicked and opened. A new sales order can also be created here.

Step3 : Choose Customer

A sales order is always specific to a customer. In this step a customer is selected from a maintained list of customers to which an order is being placed.

Step4 : Select Customer Invoice Account & Currency

In this step a specific account of the selected customer is selected and the currency of the payment to be received against the sales order mentioned.

Step 5 : Select Order Types.

Various types of orders are available in Dynamics AX ERP like Journal, Subscription, returned order and etc. The type is to be selected here.

Step 6 : Select Sales Order Origin.

Here the sales order origination is selected which may contain various details.

Step 7 : Create Sales Order

Once all the requirements are fulfilled, a sales order is finally created.

Step 8 : Select Item Sales and other Configuration

Here items are selected to be added in the sales order, Discounts can be catered too.

Step 9: Confirm Sales Order

After updating all the information required a sales order is confirmed to be placed and status becomes

"confirmed"

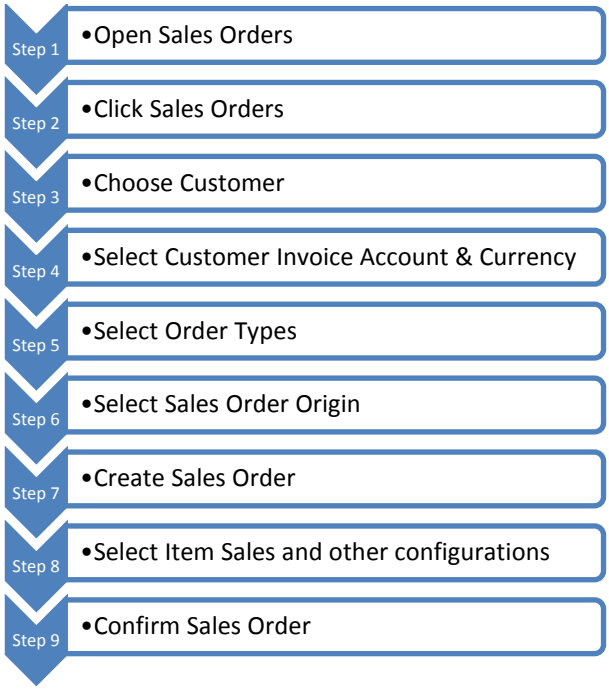

Fig. 4. Dynamic AX sales order [9], [10].

Fig. 5. Magento sales order [11].

A generalized view of the steps carried out in Sales Order process in Magento are shown in Fig. 5 [11] and the steps explained further.

Step 1: Find Products

A customer surfs the website and finds products of interest.

Step 2 : Add to Cart

Once all the products are selected that are to be purchased the user adds the selected products to his personal cart.

Step 3 : Checkout

After adding to cart customer can checkout and go towards billing.

Step 4 : Enter Customer Credentials and Shipping Address

Customer credentials like contact details credit card information and shipping address are saved.

Step 5 : Place Order

After completing all the pre-requisites steps a sales order is finally placed by the customer.

Difference where mapping is required

The major difference in both the platforms for the process of placements of orders is that the Order in Magento is placed by the customer while that in Dynamic AX it is placed by the sales person. In the Magento the customer can follow up the order status by himself rather than calling the sales personnel to get the information related to the order while the sales personnel only has the access to track the order in Dynamics AX. This has an overall impact on the process and makes the process the overall quite confined and easy in Magento as compared to than that of Dynamic AX. Due to the complexity of the sales order process in Dynamic AX the process not only becomes lengthy but also more steps adds more fields and more approvals. Hence this is an area where a process mapping is highly recommended.

6.2. Post Sales Order

Once the order is placed then various actions can be taken for the order like it may need to be shipped, cancelled, returned etc. In both Dynamic AX and Magento the post Sales Order Process are available. Fig. 6 shows the Post Sales Order process in Dynamiz AX where as Fig. 7 shows the Post Sales Order process in Magento.

Fig. 6. Post sales order process in dynamic AX [12].

Difference where mapping is required

The difference in both the platforms for the process of Post Order Sales is:

- In Dynamic AX the order first needs to picked & packed for delivery and then it is picked by the customer. Once this process is complete then the order invoice is entered in the system. Then its status becomes invoiced or returned (if the order is returned). Whereas in Magento, after the payment is made then the order is invoiced & shipped.
- As far as other steps are concerned picking and packing is not a part of the e-commerce while it is included in Dynamics AX.
- In Magento if payment is not paid and entered in the system then the order can be kept on hold. If a payment is due the order is kept un-confirmed. Where as in Dynamic AX the case is opposite.
- Dynamic AX and Magento both have the facility to cancel an order
- The customer is not allowed to have a shopping cart in Dynamics AX while e-commerce platforms including Magento surely allow different approaches to shopping carts while shopping.

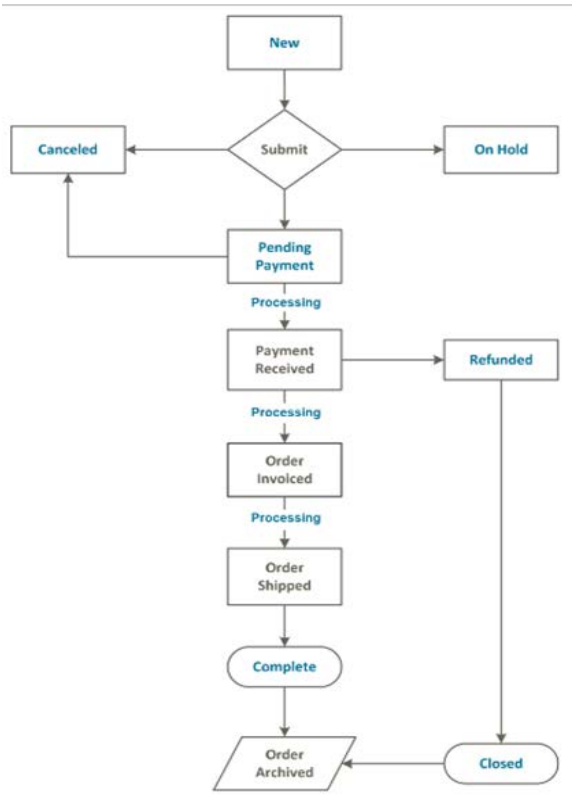

Fig. 7. Post order sales process in magento [13], [14].

6.3. Inventory Control

The process of inventory control in Dynamics AX is shown in Fig. 8.

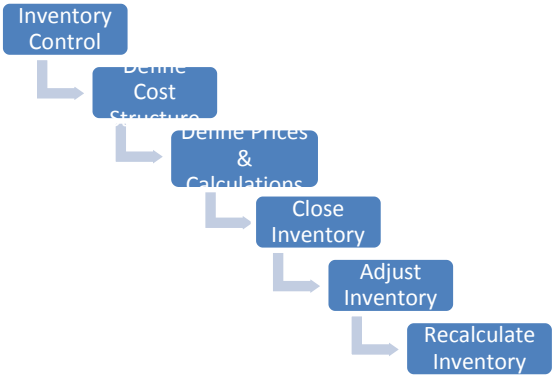

Fig. 8. Inventory control process in dynamics AX [15].

Similarly, the inventory control steps in Magento are shown in Fig. 9.

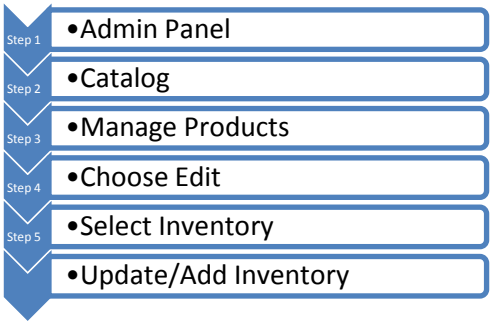

Fig. 9. Inventory control process in magento [16].

Difference where mapping is required

The main difference between the inventory controls of both the platforms are:

- Inventory can be added without providing any procurement details and product configuration in Magento while in Dynamic AX inventory is updated and added after cost and price calculations. This means that first the procurement process is completed and then inventory is auto updated. Whereas in Magento there is no procurement process.
- In Dynamic AX inventory can be closed while in Magento inventory is set to be out of stock.

7. Comparison of Terminologies

Some key terminologies used in Magento & Dynamix AX related to sales are:

7.1. Slaes in Magento

Terms related to Magento Sales [17]

- *Order submitted.* During checkout, the customer reviews the order, agrees to the Terms and Conditions, and clicks the Place Order button. Customers receive a confirmation of their orders, with a link to their customer account.
- *Order Pendin.* Before payment is processed the status of a sales order is “Pending.” At this point, the order can still be canceled.
- *Payment_received*. Depending on the payment method, you, may be notified when the transaction is authorized and in some cases, processed. The status of the invoice is now “Processing.”
- *Order invoiced.* Sometimes an order is invoiced before payment is received. In this example, the invoice is generated and submitted after the credit card payment has been authorized and processed. After the invoice is generated and submitted, a copy is sent by email to the customer.
- *Order Processing.* When the customer logs into his account to check on the order, the status is still "*Processing*."
- *Order shipped.* The shipment is submitted, and packing slips printed. You ship the package, and the customer is notified by email.

7.2. Order Statuses in Magento

Terms related to Magento Order Statuses [17]

- *Pending*: Pending orders are brand new orders that have not been processed. Typically, these orders need to be invoiced and shipped.
- *Pending PayPal*: Pending PayPal orders are brand new orders that have not been cleared by PayPal. [17].
- *Processing*: Processing means that orders have either been invoiced or shipped, but not both.
- *Complete*: Orders marked as complete have been invoiced and have shipped.
- *Cancelled*: Cancelled orders should be used if orders are cancelled or if the orders have not been paid for.
- *Closed*: Closed orders are orders that have had a credit memo assigned to it and the customer has been refunded for their order.
- *On Hold*: Orders placed on hold must be taken off hold before continuing any further actions. [17]

7.3. Order Statuses in Dynamics AX

Some terms related to dynamics ax order statuses [18]

- *Open Order* - Created and Confirmed Sales order's status
- *Delivered* - Shipped or Dispatched Sales Orders (after dispatch)
- *Invoiced* - Invoiced Sales Orders (after invoicing)
- *Canceled* - Canceled Sales Order (after cancellation)

Table 1. Examples of a Few Differences in Terminologies among Magento and Dynamic AX

Dynamic AX	Magento
Pending and Brand new orders that are not processed are called **Pending status**	Pending and Brand new orders that are not processed but created and confirmed are called **open orders** status
Orders Shipped are called **Delivered**	Orders that are shipped are called **Complete**
Orders invoiced are called **Invoiced**	Orders that are invoiced are also called **Complete**

By understanding all the differences in terminologies among both the ends it would be easy to synchronize the understanding of business processes and flows. For Example: If the order is made in Magento and copied in the Dynamics AX and if the status is different among both then the user would not be able to understand the status appropriately.

8. Comparison of Web Services

- *SOAP*: SOAP is a messaging protocol that allows programs that run on disparate operating systems (such as Windows and Linux) to communicate using Hypertext Transfer Protocol (HTTP) and its Extensible Markup Language (XML).
- *REST*: Representational State Transfer (REST) is a Software architecture style consisting of guidelines and Best practices for creating scalable web services. REST is a coordinated set of constraints applied to the design of Components in a distributed hypermedia system that can lead to a more maintainable architecture. REST efficiently Uses HTTP verbs" [19].

Microsoft Dynamics AX offers SOAP API Services to perform CRUD operations in their database while Magento offers both REST & SOAP API SERVICES to apply CRUD operations [20,21].

9. Conclusion and Recommendations for Proposed Solution

There is no confusion in that eCommerce and ERP are both there to support the business processes, help them become them fluent, and help in efficient management of resources. However, businesses using both these platforms should make sure to align processes without customizing ERP and make sure each process replicates as the same at both ends. Compromising the business processes by customizations is not a good solution and this usually ends up conflicts.

For the considered set of problems as mentioned in this research the authors have come up with a solution to cater this organizational need. The need of organizations to synchronize their point of sales and the backend ERP can be catered by developing a middle-ware connector that receives information for both the ends with respect to time and update the latest information among both the ends. The web-services can be used as APIs to avail REST and SOAP services for the sake of synchronization and data accessibility from the E-commerce platform and ERP [22,23] (i.e. Magento & Dynamics AX respectively).

While implementing the solution of such a middle-ware the problems mentioned in this research can be

solved as discussed below.

- Functionalities can be easily mapped if the core functionalities of Magento are considered and then map them with the subset of modular functionality of Dynamics AX rather than just trying to implement the solution for the module (of Dynamics AX) as a whole. This means that instead of trying to carry out end to end mapping of the whole process at both end rather first the whole process should be broken down into sub process and map one sub process to the equivalent or similar sub process in the other platform. For Example: The functionality of Inventory update in Magento can be mapped with the Inventory Control of Dynamics AX rather than mapping it to the whole Inventory Management Module of Dynamics AX.
- The Differences in terminologies can be adequately handled by mapping each terminology in regard to their meaning at both the ends. For Example: The status of processing (in Magento) means that the order either is shipped or invoiced, while there is a separate status available in Dynamics AX for both shipping termed as "Delivered" and for invoiced its "Invoiced". So while mapping these terminologies the respective meaning should be understood and mapped according to their meaning in the process/functions.
- The Services could be written through making a .net based backend in which Dynamics AX can be communicated through its SOAP API and Magento operations can be performed by using their REST or SOAP API however the authors here recommend Magento SOAP API as it has more services and features available.
- Mapping functions in Dynamics AX can be written in X++ in its Programs that can be accessed using the Program Window Dynamics AX offers.

9.1. Testing the Solution

To test the solution it was developed in four organizations who were already using Dynamic AX and Magento. The organization used the solution for 2 months and after that feedback gathered from the organization were very promising and 98% satisfaction level was achieved. Few suggestions were also put forward by the users and those were handled through customization. After which the satisfaction level improved.

9.2. Future Action

The solution would be deployed in more organizations and more such connectors can be developed to integrate other ERP & eCommerce solutions.

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