REVOLUTIONIZING ENTERPRISE RESOURCE PLANNING: A TRANSFORMATION JOURNEY IN THE ALBANIAN TELECOMMUNICATION INDUSTRY

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Abstract

This paper explores the critical aspects of ERP (Enterprise Resource Planning) transformation in the Albanian telecommunications industry. The focus is on SAP tools that include asset modules, the platform for managing ERP stock and inventory, and a new frontline platform for selling device and accessories for all the channels by supporting both mobile and fixed devices. The telecom industry has evolved significantly, and the need for efficient operations, better integration, enhanced security, and improved user experiences has become dominant. Cloudification of the SAP solution running in GCP is part of the revolution. The technical implementation is strongly related to the advantages of an ERP transformation within the telecommunications industry. These benefits include enhanced efficiency and productivity, seamless integration, and impeccable data accuracy, bolstered security and compliance, and an overall enhancement in user experiences. Furthermore, this implementation also navigates the challenges and critical considerations essential in this transformative journey. Re-usability is a key component since the successful implementation in a single market for a single local market, can be replicated in the other markets as well by justifying the high implementation cost of 3 million Euros and the involvement of 32 local stakeholder and 45 global stakeholders.

Keywords: ERP, cloudification, SAP, GCP, telecommunications.

I. INTRODUCTION

This paper explores the critical aspects of ERP (Enterprise Resource Planning) transformation within the telecommunications industry, based on the experience of the authors that have led the implantation in Vodafone Albania and on joint research activities and support. The technical implementation in the context of an ERP transformation within a telecommunications company offers a multitude of advantages, with SAP in the cloud playing a pivotal role. These benefits include heightened efficiency and productivity, seamless integration leading to enhanced data accuracy, fortified security measures ensuring regulatory compliance, and an overall enhancement of user experiences. SAP in the cloud not only brings about these improvements but also addresses the complexities and factors that are integral to this transformative process.

Cloudification is another important aspect of the implementation with huge contributions to streamlining operations and supporting the organization's agility and scalability. The rationale for this transformation is driven by the need to streamline complex operations, reduce manual tasks, optimize resource allocation, and enhance customer experiences. However, it comes with challenges, including the complexities of integrating ERP systems with extensive network infrastructures, navigating strict regulatory requirements, addressing data security concerns, and managing employee resistance to change. Despite these challenges, ERP transformation presents significant opportunities, including streamlined operations, data-driven decision-making, innovation, and improved customer satisfaction, making it a vital step for telecom companies looking to thrive in a dynamic and highly competitive industry.

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SAP (Systems, Applications, and Products) as a Leading Tool for the ERP Transformation in Telecommunications plays a pivotal role in ERP (Enterprise Resource Planning) transformation within the telecommunications industry, providing a comprehensive suite of tools and solutions that facilitate various aspects of the transformation process. Two crucial components of SAP's offerings, the asset modules and inventory management platforms, are instrumental in enhancing efficiency, improving inventory management, and ultimately delivering better sales and customer service experiences. Here, we will elaborate on their roles and provide specific examples and case studies to highlight the benefits of leveraging SAP's solutions. SAP's asset modules are essential for telecom companies as they help manage and optimize their extensive network infrastructure. By integrating the asset modules into their ERP system, telecom companies gain real-time visibility into their infrastructure, enabling them to optimize maintenance, to proper resource allocation, to monitor the performance, to optimized stock levels and improve the order fulfillment. (SAP SE Corporate, 2023).

Telecoms can schedule preventive maintenance more effectively, reducing downtime and ensuring the network's reliability. There is the possibility to allocate resources based on asset health, location, and priority, minimizing operational costs.

Real-time data allows telecoms to monitor asset performance and proactively address issues before they impact services. Below a print screen on the monitoring interface.

Sl. No	Interface ID	Middleware	Successful Messages	Failure Messages	Total Messages
1	MSISDN_SIMDeliveryConfirmation	GCP - APIGEE	0	0	0
2	EquipmentDetailsStandard	GCP - APIGEE	31	0	31
3	POSSales	GCP - APIGEE	5289	0	5289
4	CustomerReturn	GCP - APIGEE	0	0	0
5	CustomerMaster	GCP - APIGEE	38978	32775	71753
6	POSProducts	GCP - APIGEE	3353	0	3353
7	POSPriceQuery	GCP - APIGEE	4500	0	4500
8	ArticleStock	GCP - APIGEE	4495	5	4500
9	ReservationDocument	GCP - APIGEE	4	0	4
10	BillingDocumentDetails	GCP - APIGEE	114	0	114
11	BillOfMaterial	GCP - APIGEE	147	0	147
12	InspectionLogs	GCP - APIGEE	0	0	0
13	JournalEntry	GCP - APIGEE	1	0	1

PFB comments for interface report shared today:

- Customer Master API: Errors are due to incorrect payload. Issues already highlighted to CRM team. Fix will be implemented from CRM side
- Article Stock : Errors are due to incorrect plant value in payload

No Action required from SAP Side to fix these errors

Figure 1. *Interface Monitoring Report for Vodafone*

SAP's inventory management platforms cater to businesses of different sizes and helps manage and streamline fulfillment and product storage. (SAP, Inc, 2023)

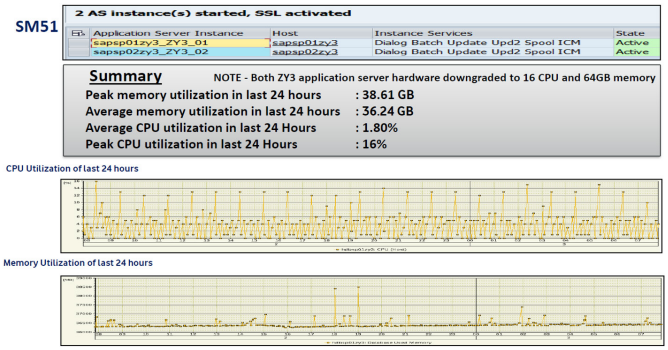


Figure 2. *ZY3-HDB and ABAP Monitoring Report for Vodafone*

It enables telecom companies to streamline their supply chain and inventory control processes. These platforms offer robust features for tracking, managing, and optimizing inventory levels, leading to more efficient operations. Telecom companies can benefit in the following ways: (SAP, Inc, 2023). By using demand forecasting and real-time inventory tracking, companies can maintain optimal stock levels, reducing carrying costs and minimizing stockouts.

Efficient inventory management ensures that customer orders are fulfilled promptly, enhancing the overall customer experience. Cost reduction is a benefit and specifically reduced carrying costs and waste translate into significant cost savings.

Figure 3. *Impacted Areas: Financial, Procurement and Sales*

Case Study: Verizon, another leading telecommunications company, integrated SAP's inventory management platform into its ERP system. This allowed Verizon to achieve a 15% reduction in carrying costs and a 20% improvement in order fulfillment rates, resulting in increased customer satisfaction and higher profitability.

II. CLOUDIFICATION OF SAP SOLUTIONS

Cloudification means more than just 'moving towards the cloud'. It also refers to the immense business opportunity that follows when you transform to a new business model, enabled by cloud computing and other technologies (Gyseling, 2023) s. In our case, the Cloudification, the process of moving SAP solutions to the cloud, holds significant importance in the telecommunications industry, particularly when considering its

integration with ERP systems. In this context, cloud deployment, such as on the Google Cloud Platform (GCP), offers substantial benefits that enhance the agility and scalability of SAP solutions, ultimately boosting the efficiency and competitiveness of telecommunications companies. In general, the typical problems that cloud computing promises to solve are as follows: concerns about the total cost of ownership of information technology services, the scalability / elasticity of the IT solution, the rigidity of investment timing, and agility. (Bernus, 2016). Cloud deployment of SAP solutions, such as on GCP, provides telecommunications companies with the agility to adapt to rapidly changing market conditions. In this highly dynamic industry, telecoms need the ability to scale resources up or down as needed. This flexibility is invaluable for staying competitive in an environment where customer demands, and technology trends evolve rapidly. The scalability of SAP in the cloud is crucial for telecommunications companies with fluctuating workloads. They often experience spikes in network traffic, especially during special events or product launches. Running SAP in the cloud allows for easy scalability, ensuring that systems can handle increased loads without the need for substantial upfront investments in hardware. This dynamic scalability is essential for ensuring a seamless customer experience and preventing service disruptions during peak usage periods.

Traditional on-premises SAP deployments require substantial investments in data centers, servers, and networking equipment. Cloud deployment, on the other hand, significantly reduces these infrastructure costs. Telecommunications companies can shift from a capital-intensive CAPEX model to an operational expenditure (OpEx) model, paying only for the resources they consume.

Accessibility is important in the telecommunications sector, where employees often need to access critical data and applications remotely. Cloud-based SAP systems ensure that employees can work from anywhere, improving collaboration, responsiveness, and decision-making. This accessibility also supports business continuity, as data and applications are available even in the face of unforeseen disruptions, such as natural disasters or pandemics. Below we showcase the APIGEE Traffic Monitoring in Cloud for Vodafone:

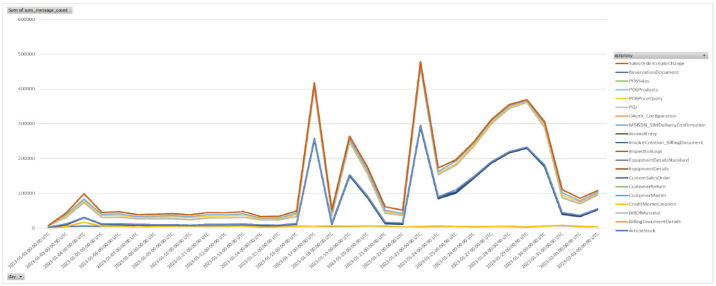


Figure 4. *Apigee Traffic Cumulative Count Report as on 3/2/2023*

Case Study: T-Mobile USA, one of the largest telecom operators in the United States, embraced cloudification by deploying SAP solutions on the Google Cloud Platform. This move allowed T-Mobile to scale its infrastructure to meet surges in customer demand during product launches and promotional events. A 20% improvement in operational efficiency and significant reduction in infrastructure costs.

III. TECHNICAL IMPLEMENTATION

There are a lot of technical challenges that are faced during every implementation, especially due to the complex infrastructures that exist in telecommunication companies. Addressing these challenges is crucial for the successful deployment and operation of ERP systems in this context. Telecommunications companies operate in a wide and elaborated network infrastructures to provide services to customers.

Integrating SAP-based ERP systems with these networks can be very challenging. ERP systems need to interact seamlessly with customer relationship management systems, billing systems and more. The below figure shows an example of an architectural view implemented in the telecommunication.

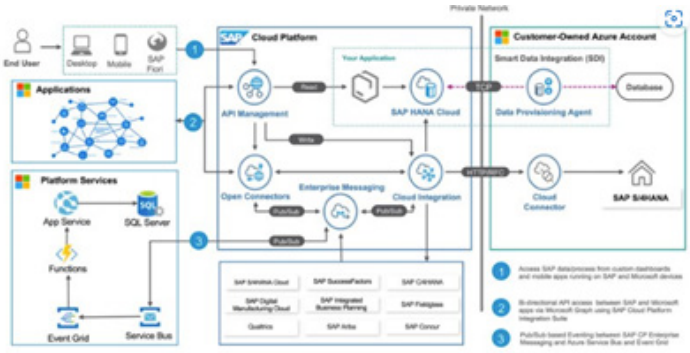


Figure 5. *Local Market architecture reference*

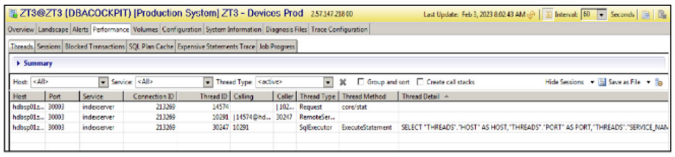
SAP Cloud Platform

Data accuracy is important in the telecommunications sector, where billing, service provisioning, and network management depend on precise and up-to-date information. Integrating ERP systems with existing data sources and ensuring the consistency and accuracy of data can be technically challenging.

Data synchronization, data cleansing, and data validation processes are necessary to prevent discrepancies, billing errors, and service interruptions. Telecom companies handle sensitive customer data and proprietary network information, making data security a top priority. The integration of SAP-based ERP systems introduces new potential vulnerabilities. Ensuring data security during the exchange of information between different systems and within the ERP system itself is a complex task.

Robust encryption, access controls, and regular security audits are vital to protect against data breaches and unauthorized access. (Saharia, Koch, & Robert Tucker, 2008)

Threads:



Blocked Transaction:

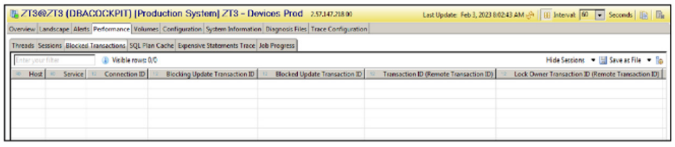


Figure 6. *Threads and Blocked Transactions Report for Vodafone*

Also, telecom companies typically have a variety of legacy systems, including network management tools, CRM systems, and billing platforms. Ensuring the compatibility of the new ERP system with these existing systems is a critical technical challenge. It often involves developing custom interfaces or middleware to facilitate data exchange and process synchronization. Compatibility issues can lead to operational inefficiencies and data discrepancies if not addressed adequately.

Data migration from legacy systems to the new ERP platform is a technical challenge. It involves extracting, transforming, and loading large volumes of data while maintaining data integrity and consistency. This process requires accurate planning and testing to ensure a smooth transition without data loss or corruption. Failure in data migration can lead to operational disruptions and costly data recovery efforts.

IV. OVERCOMING IMPLEMENTATION CHALLENGES

To overcome the technical implementation challenges in deploying SAP-based ERP systems in the telecommunications industry, telecom companies can employ a combination of strategies and best practices.

Here are some insights into how to mitigate complexities, ensure data security, and effectively manage data migration, along with real-world examples of successful implementation strategies. (Slevin & Pinto, 1986)

First, there is the need to comprehensive analysis of your network infrastructure. Identify key data sources, processes, and systems that need integration with the ERP. This analysis will help the implementation teams to understand the scope of the integration and prioritize critical components.

There is the need to implement an integration middleware. Using integration middleware, such as API gateways, to facilitate communication between ERP and network systems. This middleware simplifies the interaction between various applications and ensures data consistency. Implementing data validation and cleansing processes can help ensure data accuracy during integration. Develop data quality rules and automated validation scripts to detect and correct inconsistencies. Establishing data governance policies and practices to maintain data consistency across systems. Assigning data stewards responsible for data quality and accuracy and enforce data standards and protocols, can be an added value to the successful implementation.

Encryption and Access Controls are crucial, so teams need to pay particular attention to the implementation of a robust encryption protocols to protect data in transit and at rest. Utilize as well, access controls and role-based permissions to limit access to sensitive information. Encrypting all sensitive customer data is suggested.

The best-in-class guidelines are to conduct regular security audits and vulnerability assessments to identify and mitigate potential security risks. There is always a strong suggestion to take ahead security measures which are up to date with industry standards and best practices. Regular penetration testing and security audits were conducted to detect vulnerabilities and ensure data remained secure.

Create a detailed data mapping and transformation plan as well that outlines how data will be migrated from legacy systems to the new ERP. Use ETL (Extract, Transform, Load) tools to automate data migration. Extensive testing of data migration processes is crucial. Test data integrity and accuracy before, during, and after migration. Establish rollback procedures in case of unexpected issues.

Overcoming technical challenges in implementing SAP-based ERP systems in the telecommunications industry requires a strategic and systematic approach. These strategies can contribute to a smoother ERP transformation process, ultimately leading to improved operational efficiency and customer satisfaction.

V. HEIGHTENED OPERATIONAL EFFICIENCY AND PRODUCTIVITY

Telecom companies have realized significant efficiency gains through ERP transformation, particularly when utilizing SAP solutions deployed in the cloud. These improvements are evident in key performance indicators (KPIs).

Some important KPIs based the very first weeks after the go live:

- 35,000 API calls per day on average
- 823 transactions customer faced on average per day.

The above KPIs can be translate in reduction in manual tasks with streamlined processes and automation, telecoms reduce the need for manual data entry and processing, resulting in a decrease in errors and delays. Faster decision-making especially when cloud-based, provide real-time access to data and analytics. Below a report that shows the 30 days KPIs

Daily report as of 03.02.2023

Business area	Business Transactions	Daily(02/02/2023)		Cumulative (from 11th December)	
		# of transaction	Quantity	# of transaction	Quantity
Customer faced	Sales Orders	33	6281	1,186	87,423
	Sales Goods Issues	121	5192	6,659	89,464
	Dealer SO Reversals	0	0	1	1
	Advanced Return Management	0	0	19	35
	Sale Invoices for sale from Dealer	77	1014	4,582	28,034
	Reversal Invoices for sales	0	0	24	166
	Sale Invoices for sale from Own Shops	104	135	6,158	7,877
	Reversal Invoices for sales	1	1	80	117
Warehouse Activity	Purchase Orders	0	0	12	19,228
	Good Receipts	0	0	139	393,341
	Stock Transfer Orders (WH -> Dealers)	13	6685	142	51,880
	Stock Transfer Orders (WH -> Own shops)	0	0	10	20
	Storage Location to Storage Location (Installers' stock up)	12	229	492	20,527

	Category	Value (YTD)
Financial	Revenue Posting / Payment Order / Sales Order(Credit)	688,595,113 ALL
	Purchase Orders	135,249,885 ALL
	Good Receipts	169,963,921 ALL

Figure 7. *Key Business Process Execution Report for Vodafone*

Resource optimization is one of the key benefits. The ability to scale resources up or down in the cloud optimizes cost management, reducing operational overhead and ensuring that resources are used efficiently.
The implementation of ERP solutions, especially in the cloud, significantly enhances data accuracy and security and operational monitoring.
ERP systems incorporate data validation rules and automated checks, minimizing data entry errors. The Interface monitoring is a great support to minimize and act on the flows that show inconsistencies.

Interface ID	Message type	Sender System (S4 Retail-ZT3)			Receiver System (S4- ZE1)		
		Success	Failure	Pending	Success	Failure	Pending
AL-FIN-INT-008 (G/L Interface from Alex to EVO)	ACC_DOCUMENT	386	0	0	367	19	0
AL-SCM-INT-005 (GR from Alex to EVO)	WMM8XY	28	0	0	27	1	0
AL-SCM-INT-006 (Asset intf from Alex to EVO)	MBGMCR	260	0	0	253	7	0

Interface ID	Message type	Sender System (S4 -ZE1)			Receiver System (S4 retail- ZT3)		
		Success	Failure	Pending	Success	Failure	Pending
AL-FIN-INT-009 (vendor invoice from EVO to Alex)	Z_MM_INVOICE	0	0	0	0	0	0
AL-SCM-INT-007 (PO from EVO to Alex create)	ORDERS	0	0	0	0	0	0
AL-SCM-INT-008 (PO from EVO to Alex change)	ORDERS	0	0	0	0	0	0
AL-FIN-INT-012 (Asset info from EVO to Alex)	Z_ASSET_MSGTYP	1	0	0	1	0	0

Interface ID	Message type	POS			Receiver System (S4 retail- ZT3)		
					Success	Failure	Pending
CBM-SCM-INT-816 (POS information to ALEX)	WPUBON				191	39	0

Interface ID	Message type	Sender System (MDG-ZMA)			Receiver System (S4 retail- ZT3)		
		Success	Failure	Pending	Success	Failure	Pending
AL-MDG-INT-001/CBM-MDG-INT-045 (Article master)	ARTMAS	12	0	0	11	1	0

Figure 8. *ZT3 Module Interface Report for Vodafone*

Cumulative Count	WK50	WK51	WK52	WK01	WK02	WK03	WK04	WK05
Successful IDocs	8157	12545	14533	44466	4993	11175	9196	6863
Failed IDocs	0	6	7	5	4	13	10	65
To be Dispatched	0	0	0	0	0	0	0	0
Total Count	8157	12551	14540	44411	5365	11188	9206	6928

Figure 9. *Failed & Successful IDoc Report for Vodafone*

Cloud platforms provide robust encryption, securing data at rest and in transit. As with any form of data encryption, cloud encryption renders the information indecipherable and therefore useless without the encryption keys. This applies even if the data is lost, stolen, or shared with an unauthorized user. (Puzas, 2022). Access control is the selective restriction of access for an individual or entity to a physical location or computer systems, networks, files, and data. (Sangfor Technologies, 2023) Role-based access controls limit data access to authorized personnel only.

Case Study: Orange, a global telecommunications provider, implemented SAP ERP in the cloud, leading to a 90% reduction in data entry errors. The company also experienced zero data breaches since implementing advanced security measures.

Case Study: Vodafone Group, a global telecommunications company, ensured data security during its SAP ERP implementation by encrypting all sensitive customer data. Regular penetration testing and security audits were conducted to detect vulnerabilities and ensure data remained secure.

VI. CONCLUSIONS

ERP transformation in the telecommunications industry is a critical step towards achieving operational efficiency, meeting customer expectations, and staying competitive in a rapidly evolving market. SAP tools, asset modules, mobile and fixed device support, CRM integrations, and cybersecurity principles all play a crucial role in this transformation. This paper aims to provide insights and guidance for telecom companies considering or undergoing ERP transformation, based on the successful implementation of the erp transformation leaded by the main author. ERP transformation, especially with SAP solutions in the cloud, has a positive impact on user experiences and customer service. Cloud-based SAP systems seamlessly integrate with various customer-facing systems, improving the accuracy and timeliness of customer interactions. Real-time data and analytics provide insights that enable personalized customer interactions and better service. Enhanced ERP capabilities often include self-service portals, empowering customers to manage their services efficiently.

In summary, SAP's asset modules and inventory management platforms are instrumental in the ERP transformation within the telecommunications industry. They enable telecom companies to optimize their network infrastructure, streamline inventory management, and enhance their overall operational efficiency. Leveraging SAP's solutions empowers telecom companies to stay competitive in a rapidly evolving industry while delivering better services to their customers. The significance of cloudification in the telecommunications industry cannot be overstated. Deploying SAP solutions in the cloud, such as on the Google Cloud Platform,

empowers telecom companies with enhanced agility, scalability, reduced infrastructure costs, and improved accessibility. These advantages are particularly critical in a sector where rapid responses to changing customer needs, cost efficiency, and accessibility are vital for success. By leveraging the cloud implementations, the telecommunications companies have position themselves for sustained growth and competitive edge in an ever-evolving industry. The technical challenges faced by telecommunications companies during the implementation of SAP-based ERP systems are complex. They incorporate the integration with complex network infrastructures, ensuring data accuracy, implementing robust data security measures, managing data migration, and addressing compatibility with existing systems. Overcoming these challenges is essential to unlock the benefits of ERP systems and to streamline operations in this data-driven and highly competitive industry. Careful planning, thorough testing, and continuous monitoring are key elements in successfully navigating these challenges.

To overcome the challenges in the implementing SAP-based ERP systems in the telecommunications industry requires a strategic and systematic approach. Telecom companies can mitigate complexities by starting with a thorough analysis, ensuring data accuracy through validation and governance, enhancing data security through encryption and access controls, and managing data migration with careful planning and testing. Real-world case studies demonstrate how these strategies can contribute to a smoother ERP transformation process, ultimately leading to improved operational efficiency and customer satisfaction.

In conclusion, the tangible benefits of ERP transformation in the telecommunications sector are substantial, and they are further amplified when SAP solutions are deployed in the cloud. Telecom companies experience heightened operational efficiency, improved data accuracy and security, and enhanced user experiences, ultimately leading to improved customer service and satisfaction. Real-world examples, such as those from Vodafone, Orange, T&T demonstrate how these transformations have translated into concrete improvements in KPIs and customer interactions, making ERP transformation a valuable investment in this competitive industry.

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