ISSN: 2348-2079

*International Journal of Intellectual Advancements and Research in Engineering Computations (IJIAREC)*

*IJIAREC |Vol.11 | Issue 4 | Oct - Dec -2023*

**www.ijiarec.com**

**Research**

# A Comparative Study of SAP Migration Approaches: Integration of PROMETHEE Method for Strategic Decision Making

**Name: Suresh Deepak Gurubasannavar and Nitesh Kumar Ramancha**

**Affiliation: Sr. Director Information Technology, Southern Glazer's Wines and Spirits, United States**

*AuthorforCorrespondence:
Email: **sureshdeepakgurubasannavar@gmail.com**

Published on: 09 Nov 2023

Published by:
Suresh Deepak Gurubasannavar



## Abstract

This study delves into the complexities of SAP migration, employing the PROMETHEE method to scrutinize four divergent strategies. Key performance indicators such as system performance, sustainability, data security, scalability, cost efficiency, and downtime are meticulously analyzed. Notably, the research explores SAP's transformative journey—from conventional on-premise systems to cutting-edge cloud-based architectures—paying particular heed to the deployment of SAP S/4HANA and its profound role in reshaping enterprise digital landscapes. The methodology leverages the PROMETHEE (Preference Ranking Organization Method for Enrichment Evaluations) technique, a robust multi-criteria decision-making framework, to assess four distinct migration strategies: Migration to SAP S/4HANA with Minimal Customization, Full Migration incorporating Extensive Performance Optimization, Hybrid Cloud Deployment facilitated through HPE Green Lake, and a Comprehensive Security-Focused Migration approach. By employing weighted criteria and pair wise comparisons, the analysis delves deeply into identifying the most advantageous migration path. Remarkably, the Comprehensive Security-Focused Migration strategy emerged as the leader, achieving a net flow score of 0.3266. Trailing behind, albeit significantly, was the Full Migration with Extensive Performance Optimization at 0.1448. Crucially, the research underscores that long-term strategic gains should eclipse the allure of short-term cost reductions when selecting migration methodologies. By furnishing decision-makers with actionable insights, this investigation accentuates the indispensability of a holistic evaluation framework, advocating for a shift away from myopic technical or financial considerations towards a more comprehensive, criteria-encompassing perspective.

**Keywords:**SAP Migration, PROMETHEE Method, Digital *Transformation, Enterprise Systems, Multi-Criteria Decision Making, S/4HANA, Cloud Migration*

## 1. INTRODUCTION

SAP, an acronym for Systems, Applications, and Products in Data Processing, stands as one of the foremost titans in the realm of enterprise software solutions. Established in 1972, what began as a modest software venture has burgeoned into a global powerhouse, shaping the landscape of business applications. Its portfolio spans critical domains such as Enterprise Resource Planning (ERP), customer relationship management (CRM), and supply chain management (SCM), among others. SAP's solutions have not merely facilitated organizational workflows but have redefined how entities, regardless of scale, streamline operations, amplify efficiency, and pioneer innovation within an increasingly digitized and interconnected world [1].At the core of its offerings lies SAP ERP, a flagship system engineered to unify disparate business functions—be it finance, human resources, procurement, or production—into a cohesive, integrated framework. By breaking down departmental silos and fostering seamless interdepartmental communication, this integration empowers organizations to make informed decisions with agility and precision. Beyond its foundational role in back-end operations, SAP has adeptly adapted to the ever-evolving demands of the digital economy, continually enhancing its technologies to remain indispensable. In an era defined by digital transformation, SAP has become a cornerstone for businesses striving to optimize processes, embrace innovation, and maintain a competitive edge [2].SAP's product suite exhibits a remarkable ability to adapt across a wide array of industries.

Be it manufacturing, retail, healthcare, or finance, the company crafts bespoke solutions meticulously aligned with the intricate demands of each sector. This modular flexibility isn't merely an enhancement—it is transformative. Organizations can cherry-pick specific functionalities, deploying only what they need while seamlessly scaling their systems as business trajectories evolve. Enter SAP's cloud solutions: a paradigm shift that has fundamentally altered how enterprise software is deployed. With the advent of SAP S/4HANA—a next-generation ERP suite powered by the formidable in-memory computing platform HANA—businesses have unlocked unprecedented capabilities. Real-time processing and analytics are no longer luxuries; they're the new standard. This evolution towards a cloud-first strategy is not just timely; it is imperative. As companies race to slash infrastructure costs and bolster agility in an unforgiving dynamic marketplace, SAP's innovations lead the charge [3].A monumental turning point in SAP's journey lies in its leap from on-premise solutions to the expansive realm of cloud-based services.

The debut of SAP S/4HANA Cloud signified more than a product launch—it was an embrace of the digital economy's vast potential. Businesses now wield scalable, cloud-hosted solutions, endowed with the ability to leverage the vast reservoirs of big data and the transformative prowess of artificial intelligence. Insights once buried in the labyrinth of traditional ERP systems have become accessible, actionable, and astonishingly granular. Moreover, SAP's cloud-centric approach obliterates the disruptions traditionally associated with on-premise software updates. Continuous innovation, without the chaos of system upheavals, has become the hallmark of SAP's modern enterprise offerings [4].In recent times, SAP has aggressively pivoted towards groundbreaking advancements in machine learning, artificial intelligence (AI), and block chain technologies. These transformative tools empower organizations to not only automate laborious processes but also anticipate emerging trends with remarkable precision while fortifying data exchanges in an increasingly interconnected digital landscape. For instance, SAP Leonardo—the company's avant-garde digital innovation framework—melds the sophistication of machine learning with the pervasive connectivity of the Internet of Things (IoT). This synergy facilitates the optimization of business operations, whether in streamlining supply chain intricacies, refining product lifecycles, or revolutionizing customer engagement methodologies [5].Equally pivotal to SAP's sustained prominence is its unwavering dedication to customer-centric innovation. The SAP Customer Experience (CX) suite, which evolved from the legacy SAP Hubris platform, arms enterprises with an arsenal of tools designed to amplify customer interactions across a myriad of touch points. By seamlessly integrating marketing, commerce, sales, and service capabilities, this comprehensive suite enables businesses to curate personalized, fluid customer experiences.

What's more, this alignment of intuitive front-end solutions with robust back-end ERP systems offers a holistic strategy for managing client relationships, enhancing service quality, and ultimately driving financial performance [6].SAP's influence radiates through its carefully cultivated strategic alliances with technology juggernauts like Microsoft, Amazon Web Services (AWS), and Google Cloud. By aligning with these industry powerhouses, SAP enriches its cloud solutions, seamlessly interweaving its offerings with other leading platforms to provide businesses with optimal, cutting-edge tools tailored to their needs [8][9]. Beyond mere partnerships, SAP's active engagement with open-source innovations—evident in its contributions to the evolution of Kubernetes and Docker—demonstrates a relentless pursuit of modernity, embracing the containerised cloud architectures that now define the forefront of technological advancement [7].Yet, in the face of fierce competition from formidable enterprise software giants such as Oracle and Microsoft Dynamics, SAP's resilience and adaptability shine. It has safeguarded its preeminent status by continuously pushing the boundaries of innovation and broadening its portfolio. Noteworthy are its ventures into emerging domains like sustainability and corporate social responsibility (CSR), areas that resonate deeply with modern corporate values. A testament to its visionary approach is RISE with SAP—a holistic suite crafted to shepherd businesses

into the cloud era while championing digital transformation and embedding sustainability at the core of organisational practices [8].SAP's sprawling global footprint and its expansive network of certified partners have seamlessly positioned it to cater to an extraordinarily diverse clientele—from nimble small businesses to colossal multinational enterprises.

This vast and interconnected ecosystem, brimming with synergy, has cultivated a fertile ground for collaboration, where the exchange of knowledge thrives, and the relentless pursuit of progress is embedded in every facet of its operations [9].Peering into the future, SAP's trajectory seems primed for monumental milestones. The company's unwavering focus on harnessing AI-powered automation, cutting-edge analytics, and an ever-evolving suite of cloud capabilities is set to propel it into the next phase of its transformative journey. As industries rapidly morph and innovate, SAP's pivotal role in guiding businesses through both adversity and opportunity, all while propelling growth, will undoubtedly remain a cornerstone of its sustained success [10].Danfoss, a titan in the world of engineering solutions, has steadfastly adhered to a philosophy of innovation and sustainability. At the heart of this philosophy lies the strategic deployment of SAP (Systems, Applications, and Products) solutions—an initiative that has profoundly amplified Danfoss's operational prowess and fortified its global trade management practices [11].In 2016, Danfoss set sail on an ambitious voyage to revolutionise its IT framework, making the bold leap from SAP ERP ECC 6.0 to the cutting-edge SAP S/4HANA. This next-generation suite of interconnected business applications was chosen not just for its ability to enhance financial operations, but for its seamless integration capabilities with the pre-existing infrastructure. It wasn't merely a technological upgrade—it was a strategic pivot, one that would propel Danfoss toward greater agility and operational efficiency. The transition to SAP S/4HANA marked a defining moment in the company's evolution, a pivotal move towards a more nimble and powerful enterprise resource planning (ERP) system [12]. Fast forward to April 2024, and Danfoss took yet another giant stride in its digital metamorphosis. In an audacious move, the company adopted RISE with SAP, in tandem with HPE GreenLake. This powerhouse collaboration allows Danfoss to run its mission-critical SAP workloads within its own state-of-the-art, energy-efficient data centres. By merging the unmatched flexibility of the cloud with the steadfast control of on-premises infrastructure, this strategy lays the groundwork for enhanced operational resilience. Deploying SAP S/4HANA Cloud via HPE GreenLake not only upholds the company's ironclad standards for data sovereignty but also fortifies its reliability, ensuring the integrity of every data point. The benefits? Greater data control, reduced latency, enhanced security—elements that synergise perfectly with Danfoss's overarching sustainability ambitions [13].But that's not all. In a further leap towards operational excellence, Danfoss integrated SAP Global Trade Services (GTS) to streamline its global trade processes. This strategic addition enables the company to navigate the complex maze of international trade regulations with newfound ease, seamlessly managing everything from compliance to customs.

Through SAP GTS, Danfoss achieves an unprecedented level of automation, standardising processes that not only reduce costs but also mitigate the risks of costly fines and penalties in the volatile world of global trade [14].Danfoss's remarkable success in implementing SAP solutions can largely be attributed to its strategic alliances with some of the industry's most influential players. A prime example of this is the partnership with Hewlett Packard Enterprise (HPE), which has played a pivotal role in refining data centre operations. Through the use of HPE's cutting-edge modular data centre solutions, Danfoss has not only reduced its energy consumption but has also found a way to reuse excess heat—an initiative that directly ties into its ambitious sustainability goals [15].But that's not all. In a further testament to their collaborative prowess, Danfoss also forged a key partnership with Ernst & Young (EY) and Thomson Reuters to deploy a sophisticated trade automation system. While EY facilitated the integration of Danfoss's SAP enterprise resource planning system, Thomson Reuters' ONESOURCE Global Trade product brought the crucial element of compliance into the fold, streamlining operations across Danfoss's vast global supply chain [16].A seamless fusion of SAP solutions and strategic partnerships that has propelled Danfoss to new heights. These collaborations not only bolster operational efficiency but also support the company's overarching sustainability goals and foster robust data management practices. In fact, these forward-thinking moves are in perfect alignment with the broader ambitions of the Danfoss Group, establishing the company as a trailblazer in using technology to drive both sustainable growth and operational excellence [17].

## MATERIALS AND METHODS

The PROMETHEE (Preference Ranking Organisation Method for Enrichment Evaluations) method stands as an exceptionally effective tool for tackling the intricacies of Multi-Criteria Decision-Making (MCDM), especially when faced with the daunting task of evaluating complex alternatives. In this specific application, PROMETHEE is employed to meticulously assess and rank four distinct SAP migration strategies, each vying for attention across six critical evaluation parameters.The four alternatives in question are: M1 (Migration to SAP S/4HANA with Minimal Customisation), M2 (Full Migration with Extensive Performance Optimisation), M3 (Hybrid Cloud Deployment with HPE GreenLake), and M4 (Comprehensive Security-

Focused Migration). Meanwhile, the evaluation parameters—C1 (Performance Improvement), C2 (Sustainability), C3 (Data Security), C4 (Scalability), C5 (Cost), and C6 (Downtime)—serve as the pivotal benchmarks, each reflecting a unique facet of priority. These parameters encompass the vital pillars of operational efficiency, sustainability, robust data protection, and cost-effectiveness, together shaping the broader strategic landscape for decision-makers.

**Migration to SAP S/4HANA with Minimal Customisation**

At its core, this strategy offers a no-fuss migration to SAP S/4HANA, tweaking the existing system only minimally. The goal? A streamlined transition, lowering both complexity and costs while accelerating the entire process. While it may not unleash the full spectrum of advanced features, it serves as the perfect solution for organisations looking to swiftly upgrade, keeping disruptions to a bare minimum. It's simplicity in motion, though perhaps at the expense of unlocking the platform's true potential.

**Full Migration with Extensive Performance Optimisation**

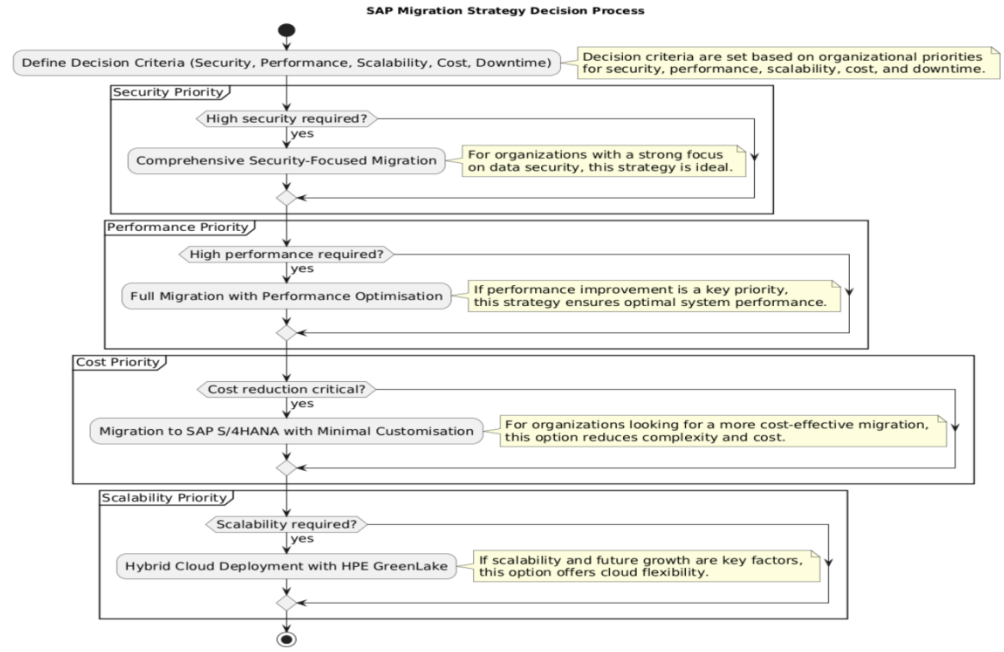
In contrast, this approach goes all-in, focusing squarely on ramping up system performance. The migration to SAP S/4HANA here is no mere update—it's a deep dive into customisation and optimisation. Expect finely tuned database operations, cutting-edge software upgrades, and enhancements that push scalability to the limit. Resource-heavy? Certainly. But the payoff is clear: superior operational efficiency and long-term value that solidify its place as a worthwhile investment.

**Hybrid Cloud Deployment with HPE GreenLake**

Now, this strategy brings a fusion of on-premises control and cloud-based freedom. By weaving SAP workloads into a hybrid cloud tapestry powered by HPE GreenLake, it strikes a delicate balance between flexibility and stability. This approach doesn't just embrace sustainability and scalability—it aligns closely with data sovereignty goals. For organisations intent on embracing cloud-enabled innovation, yet unwilling to relinquish control over their most critical business functions, this path promises the best of both worlds.

**Comprehensive Security-Focused Migration**

For those with an unwavering focus on security, this migration strategy takes no shortcuts. It places a premium on safeguarding sensitive data, incorporating cutting-edge security protocols, and ensuring regulatory compliance. Every aspect of the migration is fortified with hardening measures that protect not just during the move, but long after. Organisations with stringent security mandates and a sharp eye on risk mitigation will find this approach indispensable.




**Performance Improvement (%)**

This metric gauges the extent to which the migration amplifies the system's overall performance—primarily in terms of operational efficiency and processing velocity. A higher percentage is a direct reflection of the optimal utilisation of SAP S/4HANA's advanced functionalities, propelling workflows towards greater

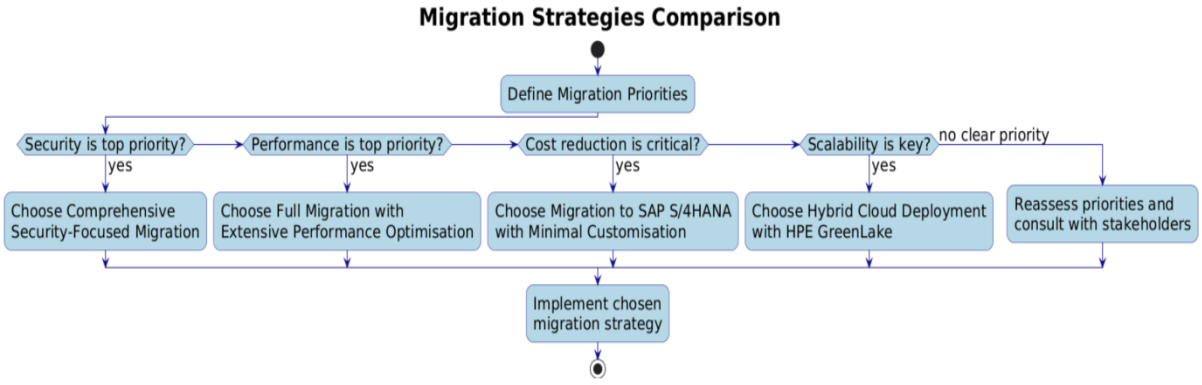
fluidity and accelerating transaction processing to unprecedented speeds. The outcome? A surge in productivity, the eradication of bottlenecks, and systems that respond with an agility hitherto unseen. Ultimately, this culminates in a transformative impact on the business, fuelling sustained growth and bolstering long-term success.

**Sustainability (Score: 1-10)**

Sustainability here goes beyond a simple assessment of environmental impact; it scrutinises the migration's alignment with green initiatives. From energy consumption to resource efficiency, and, importantly, the reduction of carbon footprints—this measure encompasses it all. The focus sharpens on eco-conscious practices such as slashing energy use, minimising waste, and championing renewable energy sources. A high sustainability score is indicative of a deeply embedded green ethos, dovetailing seamlessly with the company's broader corporate social responsibility agenda, and paving the way for a future rooted in environmental stewardship.

**Data Security (Score: 1-10)**

The crux of data security lies in the robustness of the implemented protection mechanisms during the migration. It's about safeguarding sensitive business information with an unwavering resolve. Encryption, access control, and adherence to regulatory frameworks like GDPR or CCPA are at the forefront of this evaluation. A top-tier score in this category speaks volumes: it denotes a formidable defence against cyber threats, the minimisation of potential data breaches, and an ironclad guard against unauthorised access. Above all, it ensures that the integrity and confidentiality of critical business data remain intact, fostering an atmosphere of trust and confidence among customers and stakeholders alike.




**Scalability (Score: 1-10)**

Scalability is the backbone of any successful migration, a measure of how well the system can evolve alongside the growing demands of an organisation. It's not merely about accommodating future workloads—it's about ensuring the system remains agile, seamlessly adjusting to an ever-expanding landscape of users, applications, and functionalities. A higher score in scalability signals that the SAP framework is not just prepared for growth, but primed for it, effortlessly incorporating new technological advancements and business developments without the need for painstaking overhauls. This adaptability guarantees continued performance, efficiency, and relevance in the face of unpredictable change.

**Cost (USD Million)**

Cost is more than a financial figure—it's the tangible reflection of a company's investment in the future. It encompasses infrastructure, software, training, and even the potential disruptions that come with migration. The goal is to secure a migration solution that maximises value without exceeding the financial boundaries set by the business. A lower cost doesn't merely indicate a cheaper option; it suggests a smarter investment, one that balances fiscal responsibility with the long-term benefits of enhanced system performance, bolstered security, and robust scalability. It's a delicate equilibrium, ensuring the migration delivers sustainable value while keeping the financial strain to a minimum.

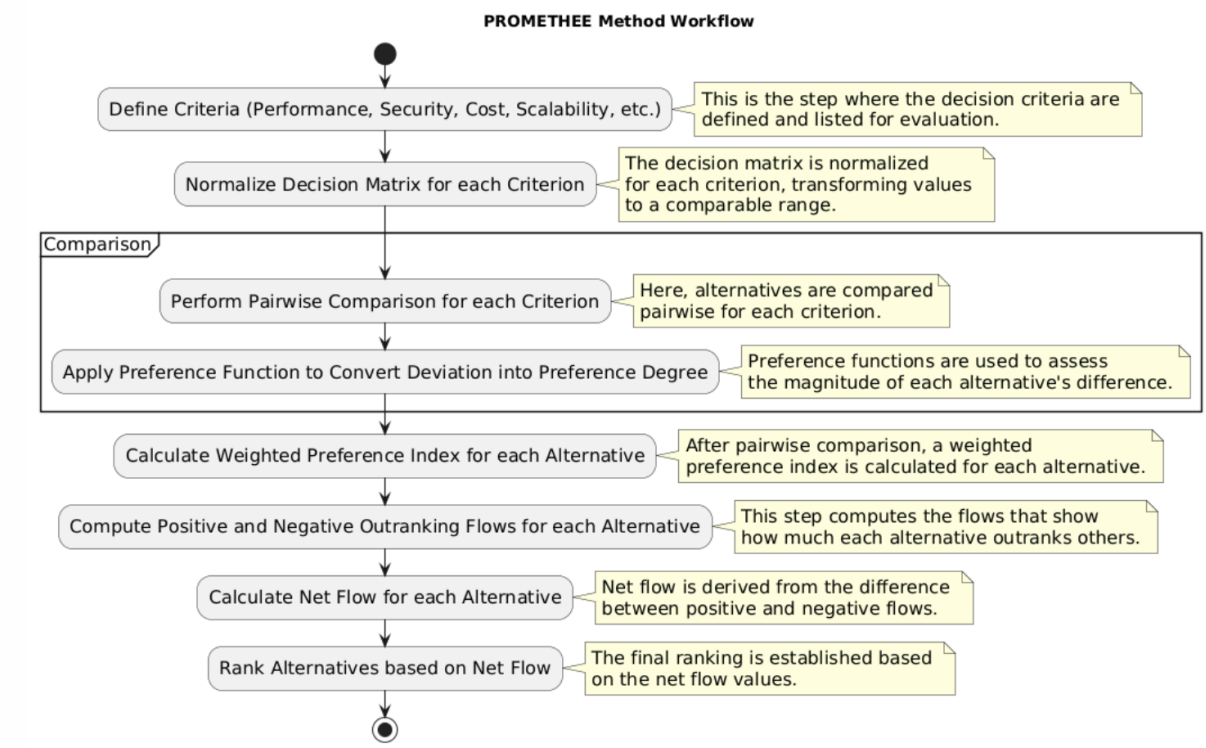
**Downtime (Hours)**

Downtime is a critical metric, measuring the window during which the system is unavailable due to migration activities. In environments where uptime is sacred, minimising downtime becomes paramount. The shorter the downtime, the less disruption to business operations, and the faster the return on investment. This

reduction in downtime doesn't just preserve productivity—it accelerates it, ensuring that business processes continue with minimal friction. As a result, user satisfaction remains high, and operational efficiency flourishes throughout the migration journey.

**PROMETHEE Method**

PROMETHEE (Preference Ranking OrganisationMETHod for Enrichment Evaluations) stands as a prominent family of multi-criteria decision-making (MCDM) methods, designed to rank and compare a set of alternatives amidst a storm of conflicting criteria. It was brought to life by Jean-Pierre Brans in the 1980s, establishing a versatile framework that empowers decision-makers to weave their preferences seamlessly into the evaluationprocess, accommodating both quantitative and qualitative data. Its applications stretch far and wide, permeating fields as varied as business, engineering, and environmental management [18-19].At the heart of the PROMETHEE method lies the concept of pairwise comparisons, a crucial technique that assesses the performance disparities between any two alternatives on each individual criterion. These differences, once quantified, are amalgamated into a preference degree—an expression of how much one alternative is favoured over another based on specific criteria. The preference degrees, themselves, are shaped by a set of preference functions, which could range from linear to stepwise, or indeed take on other forms, tailored to the nature of the criteria and the unique preferences of the decision-maker [20].The degree of preference for a pair of alternatives is determined by employing these functions, each of which assigns a net flow value to the alternatives—a reflection of the delicate equilibrium between positive and negative preferences derived from all pairwise comparisons. This net flow value is not merely a number; it encapsulates the essence of how an alternative stands in relation to the others within the set. In essence, it reveals the general tendency to prefer one alternative over the rest.




Subsequently, alternatives are ranked in accordance with these net flow values, where the highest value signifies the most preferred option, standing tall above its peers [21].The outlined steps are part of a multicriteria decision-making (MCDM) process, specifically for the PROMETHEE (Preference Ranking Organization METHod for Enrichment Evaluation) method. Here's a more structured explanation based on the given steps:

Criteria and Alternatives: Criteria (j = 1, 2, ..., k): These are the factors or attributes used to evaluate each alternative in the decision problem. Set of alternatives: The decision problem will have a set of alternatives (a) that are being evaluated based on the criteria.

Weight of Criteria: The weights of the criteria are denoted by $w_j$, where $(j = 1,2,\cdots,k)$, and the sum of all weights is normalised to 1:

$$\sum_{j=1}^{k} w_j = 1$$

These weights reflect the relative importance of each criterion in the decision-making process.

Normalisation of the Decision Matrix: The decision matrix represents the evaluation of alternatives ($x_{ij}$) for each criterion.

For Benefit Criteria:

$$R_{ij} = \frac{\left[x_{ij} - Min(x_{ij})\right]}{\left[Max(x_{ij}) - Min(x_{ij})\right]}$$

The values are normalised to a range [0, 1], where the best performance for a criterion (max value) is scaled to 1, and the worst (min value) is scaled to 0.

For Cost Criteria:

$$R_{ij} = \frac{\left[Max(x_{ij}) - x_{ij}\right]}{\left[Max(x_{ij}) - Min(x_{ij})\right]}$$

This normalisation adjusts for criteria where lower values are preferred (cost-oriented).

Deviation by Pairwise Comparison: Deviation $d_j(a,b)$: This calculates the difference between the evaluation of two alternatives a and b for each criterion j:

$$d_j(a,b) = g_j(a) - g_j(b)$$

Pairwise Comparison Function $P_j(a,b)$: This function converts the deviation into a degree of preference between 0 and 1:

$$P_j(a,b) = F_j[d_j(a,b)]$$

Here, Fj is a function that expresses how the difference in evaluations translates into a preference score.

Multicriteria Preference Index: Preference Index $\pi(a,b)$: This is a weighted sum of pairwise comparisons for each criterion:

$$\pi(a,b) = \sum_{j=1}^{k} P(a,b)w_j$$

It combines the pairwise comparisons and the weights of the criteria to give an overall preference score between two alternatives a and b.

Positive and Negative Outranking Flows: Positive Outranking Flow $\phi^+(a)$: Represents the average preference of alternative aa over all other alternatives:

$$\phi^+(a) = \frac{1}{n-1}\sum_{x \in A} \pi(a,x)$$

Negative Outranking Flow $\phi^-(a)$: Represents the average preference of all other alternatives over alternative a:

$$\phi^-(a) = \frac{1}{n-1}\sum_{x \in A} \pi(x,a)$$

Net Flow: The net flow $\phi(a)$ for each alternative is calculated as the difference between the positive and negative outranking flows:

$$\phi(a) = \phi^+(a) - \phi^-(a) = \frac{1}{n-1}\sum_{j=1}^{k}\sum_{x \epsilon A}\left|P_j(a,x) - P_j(x,a)\right| w_j$$

This results in a score that represents the overall preference of alternative aa, and the alternatives can be ranked based on their net flow values.

**Ranking the Alternatives**

Alternatives are ranked based on their net flow values $\phi(a)$, with higher values indicating better alternatives. The process, therefore, results in a ranking of the alternatives based on how well they perform on each criterion, considering their weighted importance and the pairwise preferences of each alternative over the others. This technique is widely used in decision support systems where multiple conflicting criteria are present.

A key strength of PROMETHEE lies in its remarkable flexibility: it deftly accommodates both qualitative and quantitative criteria, making it indispensable for tackling complex, real-world decision-making problems. This method offers not only a clear and easily interpretable ranking of alternatives but also provides vital insights into decision-making contexts where conflicting criteria must be weighed against each other. Moreover, PROMETHEE is adaptable—it can be expanded to deal with scenarios characterised by uncertainty, and its range of variations, such as PROMETHEE II and PROMETHEE III, introduces even more nuanced and sophisticated ranking methodologies [22].However, PROMETHEE is not without its drawbacks. One notable limitation stems from its dependence on subjective preference functions, which, if not meticulously defined, can introduce inconsistencies in the decision-making process. Furthermore, it assumes that all criteria hold equal weight unless otherwise specified—a premise that may fall short in capturing the intricacies of many real-world situations. Yet, this challenge is far from insurmountable. By incorporating weights to adjust the relative importance of criteria, decision-makers can fine-tune the model, ensuring that certain factors are prioritised over others, thereby fostering a ranking that more accurately mirrors their preferences [23-24].

## RESULTS AND DISCUSSIONS

**Table 1: Sample Dataset**

| Alternative | Performance Improvement (%) | Sustainability (Score: 1-10) | Data Security (Score: 1-10) | Scalability (Score: 1-10) | Cost (USD Million) | Downtime (Hours) |
|---|---|---|---|---|---|---|
| Migration to SAP S/4HANA with Minimal Customisation | 25 | 9 | 8 | 7 | 3.5 | 8 |
| Full Migration with Extensive Performance Optimisation | 30 | 8 | 9 | 8 | 4.2 | 10 |
| Hybrid Cloud Deployment with HPE GreenLake | 20 | 9 | 8 | 9 | 3.8 | 7 |
| Comprehensive Security-Focused Migration | 35 | 7 | 9 | 9 | 4.5 | 12 |

Table 1 unfurls a diverse set of migration alternatives, each evaluated against a range of critical metrics. This dataset serves as a lens through which we can discern the trade-offs and advantages across various dimensions such as performance improvement, sustainability, data security, scalability, cost, and downtime. The first alternative, Migration to SAP S/4HANA with Minimal Customisation, boasts a 25% performance boost. It excels in sustainability and data security, securing impressive scores of 9 and 8, respectively. Yet, it lags in scalability (7) and downtime (8 hours), marking it as a balanced yet cautious approach. With a relatively modest cost of $3.5 million, this option strikes a delicate balance between cost efficiency and performance. Next, the Full Migration with Extensive Performance Optimisation emerges as the top performer in terms of sheer performance enhancement, delivering a robust 30% increase. However, this improvement comes at a price—a slight dip in sustainability (8) and a marked improvement in data security (9). Scalability (8) and downtime (10 hours) are slightly worse than the first alternative, and with a higher cost of $4.2 million, this option underscores the inevitable tension between heightened performance and greater financial commitment. On the other hand, Hybrid Cloud Deployment with HPE GreenLake carves out its niche by prioritising sustainability with a stellar score of 9, while also achieving a commendable scalability rating of 9. However, its performance improvement is comparatively modest at 20%. With a price tag of $3.8 million and a downtime of 7 hours, this alternative seems best suited for organisations that place a premium on environmental and operational flexibility over raw performance. Finally, the Comprehensive Security-Focused Migration sets itself apart with the most substantial performance gain of all—35%. Its security and scalability scores also stand tall, yet this comes at the steepest cost of $4.5 million and a prolonged downtime of 12 hours. Such a package positions it as the ideal choice for enterprises where robust security measures are paramount, even at the cost of extended disruption and financial outlay.

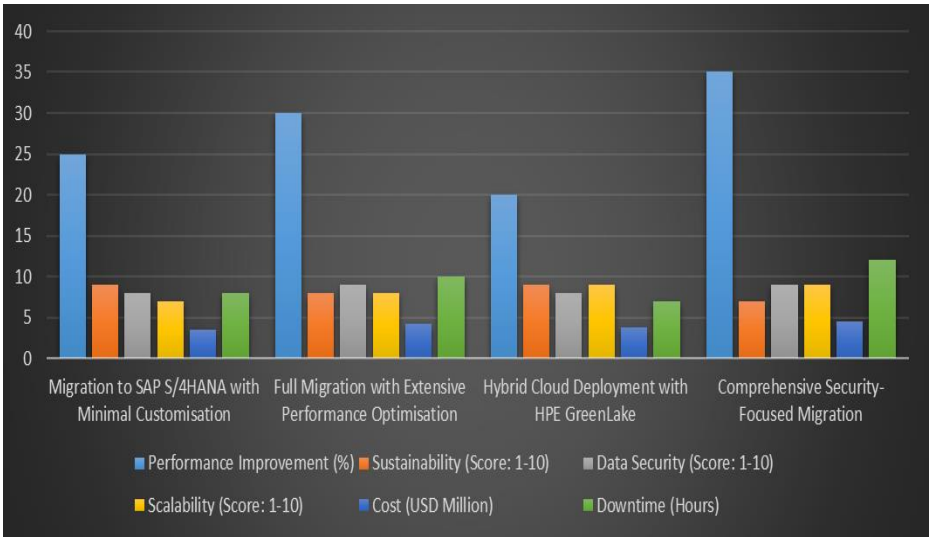



**Fig 2:**

Figure 1 illustrates a diverse range of migration alternatives, each assessed on various parameters of performance and impact. The first option, Migration to SAP S/4HANA with Minimal Customisation, delivers notable performance gains, coupled with impressive sustainability and data security ratings. Yet, it falters somewhat on scalability and downtime. The cost is relatively modest, offering a compromise between financial outlay and overall performance—striking a balance, though not without some sacrifices. In stark contrast, the second alternative, Full Migration with Extensive Performance Optimisation, soars in terms of performance enhancement—outshining all others. However, its sustainability score dips slightly, despite a significant improvement in data security. Scalability and downtime metrics take a slight hit compared to the first option, and the cost is significantly higher, underscoring the inevitable trade-off between advanced optimisation and a hefty investment. Hybrid Cloud Deployment with HPE GreenLake emerges as a more sustainable choice, boasting exceptional scalability, but falling short in performance improvement. The cost remains moderate, and downtime is tolerable, positioning this alternative as an optimal fit for organisations placing greater emphasis on long-term sustainability and scalable infrastructure. Finally, the Comprehensive Security-Focused Migration alternative stands out for its exceptional performance improvements, robust security protocols, and strong scalability metrics. However, it demands the highest financial commitment and incurs substantial downtime, making it best suited for organisations with a critical focus on security above all else.

**Table 2:**

| | C1 | C2 | C3 | C4 | C5 | C6 |
|---|---|---|---|---|---|---|
| **M1** | 0 | 0.2 | 0.333333 | 1 | 1 | 1 |
| **M2** | 0.7 | 0.6 | 0.666667 | 0.5 | 0 | 0.5 |
| **M3** | 0.3 | 0 | 0 | 1 | 1 | 0 |
| **M4** | 1 | 1 | 1 | 0 | 0 | 0 |

Table 2 unveils a normalised matrix of migration alternatives, presented through the lens of the PROMETHEE method. This method serves to scale the comparisons of various alternatives across a spectrum from 0 to 1, thus rendering a more tangible basis for evaluating their relative merits in relation to distinct criteria. The first option, Migration to SAP S/4HANA with Minimal Customisation, stands out for its unremarkable score of 0 in performance improvement—suggesting that, in comparison to its counterparts, it offers scant enhancement in performance. Yet, in the realms of cost and downtime, it shines, with both receiving flawless 1s, underscoring its exceptional cost-effectiveness and relatively diminutive downtime. Sustainability and data security, however, garner more reserved scores of 0.2 and 0.33, respectively, hinting at moderate robustness in these areas. In contrast, the second alternative, Full Migration with Extensive Performance Optimisation, achieves a solid 0.7 in performance improvement, indicating a robust uptick in performance metrics. Sustainability (0.6) and data security (0.67) are notably higher, as is scalability, which scores 0.5, reflecting a balanced, though not exceptional, adaptability. Downtime, similarly, is ranked 0.5, which suggests a reasonable compromise between performance and disruption. However, cost is strikingly marked at 0, a testament to its remarkable cost-

efficiency, even as it incurs some downtime. The Hybrid Cloud Deployment with HPE GreenLake carves out a peculiar position in the matrix. Its performance improvement is somewhat lacklustre at 0.3, yet it excels in scalability and cost, with both areas attaining perfect 1s. Still, it falters in critical aspects of data security and sustainability, earning 0s in both categories, signalling a significant deficiency in these regards. Nonetheless, its downtime is optimised to perfection with a score of 0, suggesting efficiency in maintaining system availability. Lastly, Comprehensive Security-Focused Migration presents a polarising contrast, with its remarkable scores of 1 in performance improvement, sustainability, and data security—positions reflecting its top-tier approach in these crucial areas. Unfortunately, its scalability, cost, and downtime are all marked at 0, a stark reminder of the trade-offs associated with its high-performance and security focus. This alternative, thus, stands as the choice for organisations that place paramount importance on safeguarding data and ensuring peak performance, at the cost of greater financial investment and potential downtime.

**Table 3:**

| | C1 | C2 | C3 | C4 | C5 | C6 |
|---|---|---|---|---|---|---|
| **D12** | -0.7 | -0.4 | -0.33333 | 0.5 | 1 | 0.5 |
| **D13** | -0.3 | 0.2 | 0.333333 | 0 | 0 | 1 |
| **D14** | -1 | -0.8 | -0.66667 | 1 | 1 | 1 |
| **D21** | 0.7 | 0.4 | 0.333333 | -0.5 | -1 | -0.5 |
| **D23** | 0.4 | 0.6 | 0.666667 | -0.5 | -1 | 0.5 |
| **D24** | -0.3 | -0.4 | -0.33333 | 0.5 | 0 | 0.5 |
| **D31** | 0.3 | -0.2 | -0.33333 | 0 | 0 | -1 |
| **D32** | -0.4 | -0.6 | -0.66667 | 0.5 | 1 | -0.5 |
| **D34** | -0.7 | -1 | -1 | 1 | 1 | 0 |
| **D41** | 1 | 0.8 | 0.666667 | -1 | -1 | -1 |
| **D42** | 0.3 | 0.4 | 0.333333 | -0.5 | 0 | -0.5 |
| **D43** | 0.7 | 1 | 1 | -1 | -1 | 0 |

Table 3 presents a detailed pairwise comparison of the four migration alternatives across six distinct criteria, employing the PROMETHEE method. The matrix offers a snapshot of preferences between alternative pairs, where positive values indicate a preference for the alternative listed in the row, while negative values highlight a preference for the alternative in the column. These numerical values are derived from the normalised scores provided in the preceding tables. To illustrate, consider the comparison between Migration to SAP S/4HANA with Minimal Customisation (D1) and Full Migration with Extensive Performance Optimisation (D2). Here, the values reveal intriguing nuances—criterion C1 (Performance Improvement) registers a -0.7, and C2 (Sustainability) shows -0.4, suggesting that D1 lags behind in these aspects. Yet, the comparison takes a turn when we look at cost (C5), where D2 outshines D1 with a score of 1, and similarly for downtime (C6), where it earns a 0.5. This juxtaposition reveals that D2 is clearly the frontrunner in performance improvement and scalability, but D1 holds a superior edge in cost-effectiveness and reduced downtime. In another example, the comparison between Migration to SAP S/4HANA with Minimal Customisation (D1) and Hybrid Cloud Deployment with HPE GreenLake (D3) unfolds a more complex scenario. D1 emerges as the preferred alternative in terms of performance improvement and downtime, while D3 takes the lead in scalability and cost. The fluctuating results underscore the nuanced trade-offs that must be considered. Moreover, the matrix casts light on the stark contrasts in performance across the alternatives. Take Comprehensive Security-Focused Migration (D4), for example: it stands out for its superior performance in areas like data security (C3), sustainability (C2), and performance improvement (C1), reflected in its positive scores across these criteria. However, D4's performance is far from flawless, as it struggles with cost (C5) and downtime (C6), where it scores significant negative values, highlighting its relative inefficiency in these areas.

**Table 4:**

| Weight | 0.2336 | 0.1652 | 0.3355 | 0.1021 | 0.0424 | 0.1212 | Preference Sum |
|---|---|---|---|---|---|---|---|
| **D12** | 0 | 0 | 0 | 0.05105 | 0.0424 | 0.0606 | 0.15405 |
| **D13** | 0 | 0.03304 | 0.111833 | 0 | 0 | 0.1212 | 0.266073 |
| **D14** | 0 | 0 | 0 | 0.1021 | 0.0424 | 0.1212 | 0.2657 |
| **D21** | 0.16352 | 0.06608 | 0.111833 | 0 | 0 | 0 | 0.341433 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **D23** | 0.09344 | 0.09912 | 0.223667 | 0 | 0 | 0.0606 | 0.476827 |
| **D24** | 0 | 0 | 0 | 0.05105 | 0 | 0.0606 | 0.11165 |
| **D31** | 0.07008 | 0 | 0 | 0 | 0 | 0 | 0.07008 |
| **D32** | 0 | 0 | 0 | 0.05105 | 0.0424 | 0 | 0.09345 |
| **D34** | 0 | 0 | 0 | 0.1021 | 0.0424 | 0 | 0.14450 |
| **D41** | 0.2336 | 0.13216 | 0.223667 | 0 | 0 | 0 | 0.58943 |
| **D42** | 0.07008 | 0.06608 | 0.111833 | 0 | 0 | 0 | 0.24799 |
| **D43** | 0.16352 | 0.1652 | 0.3355 | 0 | 0 | 0 | 0.66422 |

Table 4 unveils the intricate preference values derived through the PROMETHEE method, offering a ranking of migration alternatives, intricately shaped by the weighted criteria. To calculate each preference value, one must multiply the performance differences between each alternative and its counterparts by the designated weights for each criterion. These resulting values are then aggregated, yielding a comprehensive total preference score for every alternative. Take, for instance, the Migration to SAP S/4HANA with Minimal Customisation (D1). With a relatively modest preference value of 0.15405, it barely stands out in comparison to other alternatives, indicating it's not overwhelmingly preferred. While it receives some positive points from downtime (C6) and cost (C5), the criteria of performance improvement (C1), sustainability (C2), and data security (C3) add little weight to its overall standing. On the other hand, the Full Migration with Extensive Performance Optimisation (D2) earns a somewhat stronger preference value of 0.26607, primarily owing to its significant contributions in terms of data security (C3) and performance enhancement (C1). However, even with these gains, its total score is still eclipsed by more compelling alternatives, such as the Comprehensive Security-Focused Migration (D4), which boasts a formidable preference value of 0.58943. This superior score underscores D4's dominance in key areas, notably in performance improvement (C1) and data security (C3), even though cost and downtime have little bearing on its evaluation. When examining the Hybrid Cloud Deployment with HPE GreenLake (D3) and Comprehensive Security-Focused Migration (D4), it becomes clear that these alternatives sit comfortably among the highest-ranked options. D3, with a preference value of 0.47683, stands out for its robust performance in sustainability (C2) and data security (C3). D4, however, soars to the top with an outstanding preference value of 0.66422, cementing its position as the ultimate choice, driven by its superior performance in critical areas like performance improvement (C1) and data security (C3), despite its lack of noteworthy contributions in other categories such as cost and downtime.

**Table 5: Sum of Performance Value**

| | **M1** | **M2** | **M3** | **M4** | **SUM** | **positive flow** |
|---|---|---|---|---|---|---|
| **M1** | 0.0000 | 0.1541 | 0.2661 | 0.2657 | 0.6858 | 0.2286 |
| **M2** | 0.3414 | 0.0000 | 0.4768 | 0.1117 | 0.9299 | 0.3100 |
| **M3** | 0.0701 | 0.0935 | 0.0000 | 0.1445 | 0.3080 | 0.1027 |
| **M4** | 0.5894 | 0.2480 | 0.6642 | 0.0000 | 1.5016 | 0.5005 |
| **SUM** | 1.0009 | 0.4955 | 1.4071 | 0.5219 | | |
| **Negative Flow** | 0.3336 | 0.1652 | 0.4690 | 0.1740 | | |

Table 5 reveals a comparative analysis of performance values for each migration alternative, shedding light on how they stack up against one another through the lens of preference values. Calculated via the PROMETHEE method, the matrix presents both positive and negative flow values, which encapsulate the overall performance and the degree of preference each alternative holds over its counterparts. In the final column, the sum of performance values for each alternative—M1, M2, M3, and M4—comes into focus. At the top of the chart, Comprehensive Security-Focused Migration (M4) claims the highest sum of 1.5016, closely trailed by Full Migration with Extensive Performance Optimisation (M2) at 0.9299. Meanwhile, Hybrid Cloud Deployment with HPE GreenLake (M3) and Migration to SAP S/4HANA with Minimal Customisation (M1) fall behind, recording sums of 0.3080 and 0.6858, respectively, highlighting their relatively lower overall performance. The positive flow for each alternative, which denotes the total preference value, further underscores M4's dominance, with a positive flow of 0.5005. This indicates its position as the most strongly preferred option when stacked against the others. M2 is next, with a positive flow of 0.3100, while M3 and M1 exhibit more modest preference values, with positive flows of 0.1027 and 0.2286, respectively. As for the negative flow, which measures the extent to which each alternative is less favoured in comparison to the others, M4 again emerges

favourably, possessing the lowest negative flow of 0.1740. This reinforces its standing as the most preferred alternative. Conversely, M3 exhibits the highest negative flow at 0.4690, placing it at the bottom of the preference scale. In conclusion, the analysis unmistakably identifies Comprehensive Security-Focused Migration (M4) as the most preferred choice, followed by Full Migration with Extensive Performance Optimisation (M2), while Hybrid Cloud Deployment with HPE GreenLake (M3) trails behind as the least favouredalternative.Table 5 reveals a comparative analysis of performance values for each migration alternative, shedding light on how they stack up against one another through the lens of preference values. Calculated via the PROMETHEE method, the matrix presents both positive and negative flow values, which encapsulate the overall performance and the degree of preference each alternative holds over its counterparts. In the final column, the sum of performance values for each alternative—M1, M2, M3, and M4—comes into focus. At the top of the chart, Comprehensive Security-Focused Migration (M4) claims the highest sum of 1.5016, closely trailed by Full Migration with Extensive Performance Optimisation (M2) at 0.9299. Meanwhile, Hybrid Cloud Deployment with HPE GreenLake (M3) and Migration to SAP S/4HANA with Minimal Customisation (M1) fall behind, recording sums of 0.3080 and 0.6858, respectively, highlighting their relatively lower overall performance. The positive flow for each alternative, which denotes the total preference value, further underscores M4's dominance, with a positive flow of 0.5005. This indicates its position as the most strongly preferred option when stacked against the others. M2 is next, with a positive flow of 0.3100, while M3 and M1 exhibit more modest preference values, with positive flows of 0.1027 and 0.2286, respectively. As for the negative flow, which measures the extent to which each alternative is less favoured in comparison to the others, M4 again emerges favourably, possessing the lowest negative flow of 0.1740. This reinforces its standing as the most preferred alternative. Conversely, M3 exhibits the highest negative flow at 0.4690, placing it at the bottom of the preference scale. In conclusion, the analysis unmistakably identifies Comprehensive Security-Focused Migration (M4) as the most preferred choice, followed by Full Migration with Extensive Performance Optimisation (M2), while Hybrid Cloud Deployment with HPE GreenLake (M3) trails behind as the least favoured alternative.

**Table 6: Positive flow, Negative flow, Net flow**

| | positive flow | Negative Flow | Net flow |
|---|---|---|---|
| Migration to SAP S/4HANA with Minimal Customisation | 0.2286078 | 0.3336467 | -0.1050389 |
| Full Migration with Extensive Performance Optimisation | 0.30997 | 0.1651644 | 0.1448056 |
| Hybrid Cloud Deployment with HPE GreenLake | 0.1026767 | 0.46904 | -0.3663633 |
| Comprehensive Security-Focused Migration | 0.5005467 | 0.17395 | 0.3265967 |

Table 6 encapsulates the intricate dynamics of migration alternatives, presenting the positive flow, negative flow, and net flow values derived from the PROMETHEE method. These numerical indicators serve as the bedrock upon which alternatives are ranked, offering a nuanced insight into their overall desirability. The positive flow, an essential gauge of preference, reveals the extent to which one alternative surpasses the others in favourability. At the pinnacle, Comprehensive Security-Focused Migration reigns supreme with a robust positive flow of 0.5005, a testament to its stellar performance across the range of criteria evaluated. Not far behind, Full Migration with Extensive Performance Optimisation holds a respectable position with a positive flow of 0.3100. However, Migration to SAP S/4HANA with Minimal Customisation (0.2286) and Hybrid Cloud Deployment with HPE GreenLake (0.1027) trail significantly, indicating less pronounced favourability. On the flip side, the negative flow illustrates the degree to which an alternative falls short in comparison to the others. In this regard, Hybrid Cloud Deployment with HPE GreenLake suffers the most, marked by the highest negative flow at 0.4690, solidifying its position as the least desirable option. In contrast, Comprehensive Security-Focused Migration (0.1739) and Full Migration with Extensive Performance Optimisation (0.1651) exhibit markedly lower negative flows, underscoring their relative superiority in the competitive landscape. The net flow, derived from the delicate balance between positive and negative flows, provides the final judgement. Here, Comprehensive Security-Focused Migration claims the crown with a net flow of 0.3266, followed by Full Migration with Extensive Performance Optimisation at 0.1448. However, both Migration to SAP S/4HANA with Minimal Customisation (-0.1050) and Hybrid Cloud Deployment with HPE GreenLake (-0.3664) fall into negative territory, signalling their comparative underperformance.

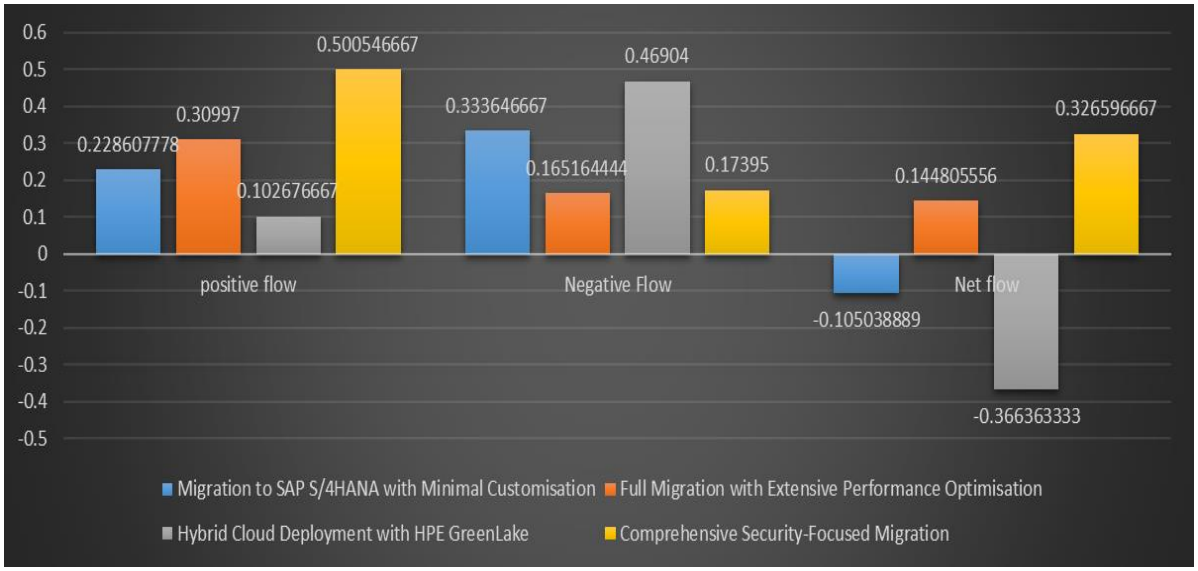



**Fig 2:**

Figure 2 vividly portrays the intricate dynamics of positive flow, negative flow, and net flow values for each migration alternative, all meticulously evaluated through the PROMETHEE method. These critical metrics serve as the backbone for assessing the relative desirability of each alternative, offering a comprehensive lens through which to gauge their performance. The positive flow, an indicator of preference strength, reveals how much one option stands out against its competitors. Leading the pack is the Comprehensive Security-Focused Migration, which achieves an impressive positive flow of 0.5005, a clear testament to its formidable overall standing. Close behind, the Full Migration with Extensive Performance Optimisation captures a positive flow of 0.3100, while the Migration to SAP S/4HANA with Minimal Customisation (0.2286) and Hybrid Cloud Deployment with HPE GreenLake (0.1027) follow in succession, each progressively trailing in desirability. On the flip side, the negative flow provides a stark contrast, measuring the extent to which an alternative falls short in comparison to others. The Hybrid Cloud Deployment with HPE GreenLake takes the dubious honour of the highest negative flow, recording a significant -0.4690, thus cementing its position as the least favourable choice. In a far more competitive light, the Full Migration with Extensive Performance Optimisation (-0.1651) and the Comprehensive Security-Focused Migration (-0.1739) display markedly lower negative flows, reinforcing their relative strengths in this comparison. The net flow, which emerges from the balance between positive and negative flows, offers the definitive verdict on each alternative's ranking. Dominating this final analysis, the Comprehensive Security-Focused Migration claims the top spot with a robust net flow of 0.3266. The Full Migration with Extensive Performance Optimisation follows with a respectable 0.1448, while the Migration to SAP S/4HANA with Minimal Customisation (-0.1050) and Hybrid Cloud Deployment with HPE GreenLake (-0.3664) trail significantly in the negative, signifying their relative shortcomings.

**Table 7: Rank**

| | Rank |
|---|---|
| Migration to SAP S/4HANA with Minimal Customisation | 3 |
| Full Migration with Extensive Performance Optimisation | 2 |
| Hybrid Cloud Deployment with HPE GreenLake | 4 |
| Comprehensive Security-Focused Migration | 1 |

Table 7 unveils the conclusive hierarchy of migration alternatives through the lens of the PROMETHEE method, an intricate model that meticulously synthesises positive flow, negative flow, and net flow metrics to uncover the frontrunners in this complex decision-making process. At the pinnacle of this ranking, Comprehensive Security-Focused Migration (Rank 1) stands unchallenged. Its dominance is undeniable, marked by an unwavering consistency across a spectrum of criteria—especially in performance enhancement, data security, and sustainability. The sheer magnitude of its net flow score, bolstered by an impressive positive flow and remarkably low negative flow, cements its status as the most robust and well-rounded choice among the four alternatives. Not far behind, yet with a distinct positioning, is Full Migration with Extensive Performance

Optimisation (Rank 2). This alternative proves formidable, boasting a solid balance of performance gains and data security. Despite its slightly less comprehensive nature compared to the top contender, it strikes a nuanced equilibrium between features and costs, positioning it as the go-to option for organisations keen on substantial performance improvements, yet unwilling to sacrifice too much on operational costs or downtime. Meanwhile, Migration to SAP S/4HANA with Minimal Customisation (Rank 3) secures the third spot, presenting a cost-effective solution with minimal disruption. However, its relatively modest performance improvements and limited scalability undercut its competitive edge. As such, it caters primarily to organisationsprioritising budgetary constraints and operational efficiency, rather than striving for cutting-edge performance or robust security measures. Bringing up the rear is Hybrid Cloud Deployment with HPE GreenLake (Rank 4). Although it shines in scalability, this alternative falters significantly when it comes to other critical dimensions. Its underwhelming performance, especially in data security and sustainability, renders it a less attractive proposition overall.

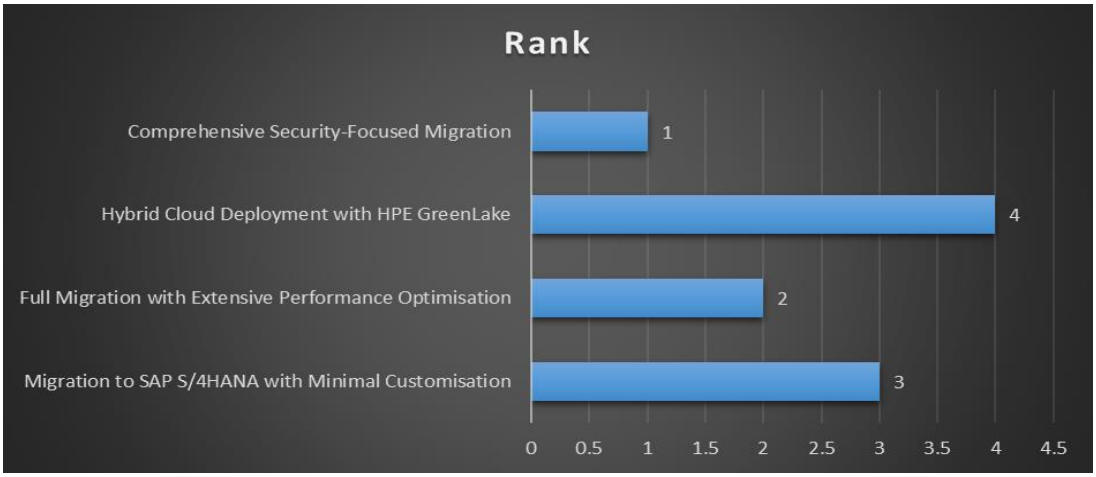



**Fig 3:**

Figure 3 presents a compelling depiction of the final ranking of migration alternatives, determined through the intricate PROMETHEE method. This method weaves together the positive flow, negative flow, and net flow values to produce a comprehensive assessment of the most viable options, ensuring a nuanced evaluation of their respective merits. At the pinnacle of the rankings, Comprehensive Security-Focused Migration (Rank 1) emerges as the undisputed leader, a testament to its unyielding excellence across a myriad of criteria. With stellar performance improvements, exceptional data security, and long-term sustainability, it outshines its competitors. The strength of its net flow, underpinned by the highest positive flow and one of the lowest negative flows, solidifies its position as the most balanced, well-rounded, and overwhelmingly favoured choice—one that sets the bar for the others to follow. Following closely behind, Full Migration with Extensive Performance Optimisation claims second place (Rank 2). While not quite matching the top contender's multifaceted superiority, it still excels notably in performance enhancement and data security, paired with a relatively modest negative flow. This alternative is an appealing prospect for organisations looking to make significant performance strides without succumbing to excessive costs or protracted downtime, offering a pragmatic balance of benefits. In third place (Rank 3), Migration to SAP S/4HANA with Minimal Customisation reveals itself as a cost-effective and time-efficient solution, albeit with notable trade-offs. While it delivers reduced downtime and lower costs, its limitations in terms of performance improvement and scalability render it less enticing overall. This choice speaks more to organisations whose priorities lie in budget optimisation and operational efficiency rather than seeking cutting-edge functionality. Finally, Hybrid Cloud Deployment with HPE GreenLake secures the fourth position (Rank 4). Though it stands out in scalability, its performance falters in crucial domains such as data security and sustainability, effectively weakening its overall appeal. For those in search of a well-rounded, future-proof solution, this alternative falls short, making it the least favourable choice among the four.The findings meticulously unveil the ranking of migration alternatives via the PROMETHEE method, which astutely weaves together positive, negative, and net flow values, offering a multidimensional lens for thorough evaluation. At the forefront, Comprehensive Security-Focused Migration boldly claims the top spot, owing to its formidable performance across pivotal criteria—data security, performance enhancement, and sustainability—together with an unparalleled net flow. Trailing closely, Full Migration with Extensive Performance Optimisation secures second place, offering a judicious equilibrium, boasting impressive gains in both performance and data security. Meanwhile, Migration to SAP S/4HANA with Minimal Customisation occupies third position, renowned for its cost-effectiveness and negligible downtime,

yet its limited scalability and restrained performance gains inevitably temper its competitiveness. Lastly, Hybrid Cloud Deployment with HPE GreenLake languishes at the bottom of the ranking, where its sole merit lies in scalability—a lone advantage, overshadowed by poor outcomes in both data security and sustainability. Together, these results arm decision-makers with a robust foundation to harmonise migration strategies with overarching organisational imperatives.

## CONCLUSION

Danfoss's strategic embrace of SAP solutions serves as a powerful testament to how enterprise resource planning can catalyse not only digital transformation but also operational excellence in the contemporary business landscape. Their shift from SAP ERP ECC 6.0 to SAP S/4HANA, complemented by the recent integration of RISE with SAP alongside HPE GreenLake, represents a sophisticated, multi-faceted approach to IT infrastructure modernisation. Yet, this is not merely about technical upgrades; it is a seamless marriage of technology with the pursuit of data sovereignty and sustainability objectives. By dissecting this real-world implementation, we gain invaluable insights into the strategic importance of selecting the right migration paths when embarking on such profound digital overhauls.The PROMETHEE analysis of four distinct SAP migration strategies offers a nuanced exploration of these very pathways. Among the array of options, the Comprehensive Security-Focused Migration stands out as the unequivocal frontrunner, crowned first due to its exceptional performance across critical domains—data security, performance enhancement, and sustainability. Its robust positive flow, paired with a strikingly low negative flow, signals a well-rounded and resilient strategy—one that deftly navigates the intricacies of today's business ecosystem. In an era where data security and system performance are paramount, this strategy epitomises the careful balancing act needed to meet both technological and corporate imperatives.The Full Migration with Extensive Performance Optimisation claimed the second spot, striking a fascinating equilibrium between optimised performance and robust security features, all while ensuring cost-effectiveness remains well within reasonable limits. This method is especially fitting for organisations where operational efficiency takes precedence, yet security cannot be sacrificed. In stark contrast, the Migration to SAP S/4HANA with Minimal Customisation—ranked third—offers undeniable cost benefits and reduced downtime. However, its scalability and performance improvements were found lacking, rendering it more appropriate for organisations with relatively modest transformation ambitions.The analysis positioned Hybrid Cloud Deployment with HPE GreenLake as the least favoured option, despite its compelling scalability features. This ranking underscores the increasingly pivotal role of robust security measures and sustainability in modern enterprise software deployments. Indeed, the findings illustrate that successful SAP migrations are far more than a technical endeavour—they necessitate a nuanced evaluation of numerous factors, including long-term sustainability, stringent security requirements, and the broader operational ramifications.Such insights offer crucial guidance for organizations embarking on SAP migrations, accentuating the critical need to tailor migration strategies to align with specific organisational priorities and demands. The study highlights that while cost and implementation speed retain their importance, the truly successful migration strategies are those that strike a careful equilibrium between security, performance, and sustainability. This holistic approach empowers organisations to maximise SAP's advanced capabilities while safeguarding operational resilience and adapting to ever-shifting business needs.

## REFERENCES

1. Antwi, Bernard Owusu, and Eli Kofi Avickson. "Integrating SAP, AI, and Data Analytics for Advanced Enterprise Management." *International Journal of Research Publication and Reviews* 5, no. 10 (2024): 621-636.
2. Lech, Przemysław, Dariusz Samól, and MariyaShygun. "Evolution And Deployment Options of Enterprise Systems: The Case of SAP S/4HANA Enterprise Application Suite." In *Proceedings of the 42-Nd International Business Information Management Association (IBIMA) Conference*, pp. 32-42. 2023.
3. Shaik, Moyinuddeen. "SAP-ERP Software's Pivotal Role in Shaping Industry 4.0: Transforming the Future of Enterprise Operations." *Computer Science and Engineering* 13, no. 1 (2023): 8-14.
4. Aroba, Oluwasegun Julius, AdefemiOluwaniyiOwoputi, and Temitayo Mathew Fagbola. "An SAP enterprise resource planning implementation using a case study of hospital management system for inclusion of digital transformation." *International Journal of Computer Information Systems and Industrial Management Applications* 15 (2023): 12-12.
5. Yu, H. Y., Akinola Ogbeyemi, W. J. Lin, Jingyi He, Wei Sun, and Wen-Jun Zhang. "A semantic model for enterprise application integration in the era of data explosion and globalisation." *Enterprise Information Systems* 17, no. 4 (2023): 1989495.

6. Reddi, L. Thamma. "Transforming Management Accounting: Analyzing The Impacts Of Integrated Sap Implementation." *International Research Journal of Modernization in Engineering Technology and Science* 5, no. 8 (2023): 1786-1793.
7. HancerliogullariKoksalmis, Gulsah, and SeckinDamar. "An empirical evaluation of a modified technology acceptance model for SAP ERP system." *Engineering Management Journal* 34, no. 2 (2022): 201-216.
8. Soellner, Sigita. "Digital Elements for SAP ERP Education and Training: Results from a Systematic Literature Review." *International Journal of Engineering Pedagogy* 11, no. 4 (2021).
9. Khatri, Dignesh Kumar, P. Goel, and A. Renuka. "Optimizing SAP FICO Integration with Cross-Module Interfaces." In *SHODH SAGAR: International Journal for Research Publication and Seminar, 15 (1), 188. Link*. 2024.
10. Vaid, Adarsh, and Chetan Sharma. "Leveraging SAP and Artificial Intelligence for optimized enterprise resource planning: enhancing efficiency, automation, and decision-making." *DOI https://doi. org/10.30574/wjarr* 3 (2022).
11. Koch, Christian. "ERP Software packages: between mass-production communities and intra-organizational political processes." In *Technological change and organizational action*, pp. 70-90. Routledge, 2003.
12. Smith, Brian. *Leading Practices: Iterative Cycles Enable Rapid Delivery of Complex Innovative Products*. Acquisition Research Program, 2024.
13. Galjot, Špela. "Succession management: A Case Study of Danfoss Trata." Master's thesis, ISCTE-Instituto Universitario de Lisboa (Portugal), 2018.
14. Nielsen, Christian P., AkshayAvhad, Casper Schou, and Elias Ribeiro da Silva. "Control system architecture for matrix-structured manufacturing systems." *Computers in Industry* 146 (2023): 103851.
15. Ozolina, Lina. "Refining Cost Allocation of Professional Services in a Software as a Service Business, Case Company: Leanheat Oy." (2024).
16. Corallo, Angelo, Anna Maria Crespino, Mariangela Lazoi, Antonio Margarito, and Claudio Rocco. "Using Process Automation for Optimizing Engineering Practice." In *Proceedings of the 6th European Lean Educator Conference: ELEC 2019 6*, pp. 341-350. Springer International Publishing, 2020.
17. Fitton, Richard, Heidi Diaz Hernandez, David Farmer, Grant Henshaw, AnestisSitmalidis, and William Swan. "Saint Gobain& Barratt Developments “eHome2” Baseline Performance Report." (2024).
18. da Cunha, Richard Alex, Luís Alberto Duncan Rangel, Christian A. Rudolf, and Luiza dos Santos. "A decision support approach employing the PROMETHEE method and risk factors for critical supply assessment in large-scale projects." *Operations Research Perspectives* 9 (2022): 100238.
19. Oubahman, Laila, and SzabolcsDuleba. "Review of PROMETHEE method in transportation." *Production Engineering Archives* 27, no. 1 (2021): 69-74.
20. Tong, Li Zhong, Jindan Wang, and Zhongmin Pu. "Sustainable supplier selection for SMEs based on an extended PROMETHEE II approach." *Journal of Cleaner Production* 330 (2022): 129830.
21. Watrianthos, Ronal, Wahyu AzharRitonga, AysyahRengganis, AnjarWanto, and M. Isa Indrawan. "Implementation of PROMETHEE-GAIA Method for Lecturer Performance Evaluation." In *Journal of Physics: Conference Series*, vol. 1933, no. 1, p. 012067. IOP Publishing, 2021.
22. Seikh, MijanurRahaman, and Utpal Mandal. "Interval-valued Fermatean fuzzy Dombi aggregation operators and SWARA based PROMETHEE II method to bio-medical waste management." *Expert Systems with Applications* 226 (2023): 120082.
23. Sotiropoulou, Kalliopi F., and Athanasios P. Vavatsikos. "Onshore wind farms GIS-Assisted suitability analysis using PROMETHEE II." Energy Policy 158 (2021): 112531.
24. Molla, Mahatab Uddin, Bibhas C. Giri, and Pranab Biswas. "Extended PROMETHEE method with Pythagorean fuzzy sets for medical diagnosis problems." Soft Computing 25 (2021): 4503-4512.