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Evaluation of Maintenance and Repair Contracts Used in the Mining Industry by Service Providers

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Abstract

The maintenance and repair contract (MARC) is a document that governs the relationship between the client and maintenance service provider during the outsourcing of support services in the mining industry. These contracts are administered through detailed service level agreements and suitable key performance indicators, requiring expertise across technical, economic, financial, procurement, legal, security, logistical and many more domains. This research explored four broad-based factors in MARC relationships: drivers, concerns/drawbacks, benefits, and profitability for service providers in mining. Using the case study approach of qualitative research, a MARC-utilizing service provider was selected as the population, with seven strategic and tactical leaders as participants. An interview guide was used to collect demographic information, and open-ended and qualitative questions for numerical responses. Findings indicated that the contract documents were beneficial and profitable to the service provider, as they were designed to create mutually advantageous relationships for all stakeholders. The study highlights the importance of thorough preparation before entering into MARC agreements and emphasizes critical success factors for implementation. The research identified challenges including communication barriers, operational constraints, and resource limitations. It recommends the periodic review of MARC documents, particularly regarding contract scope and other issues to maintain cordial relationships when executing MARC agreements.

Keywords
Benefits, Concerns, Drivers, Maintenance and repair contract, Profitability.

1. Introduction

The maintenance and repair contract (MARC) is the document commonly used for the management of the outsourcing relationship between the client and maintenance service provider, for the management of static, mobile machines and other support services in the mining industry. It is the legal agreement mutually endorsed by two or more parties with clearly defined roles and responsibilities. In a typical MARC relationship, the parties involved are the client, the service provider and or the original equipment manufacturer (OEM) (Olivier 2008). The contract establishes that the service provider (or OEM) must provide timely and progressive repair and maintenance of allocated machines. This ensures that production line equipment remains available for the client's core operational functions (Van Horenbeek et al. 2012). The contract document should be comprehensive and well-structured. It must include a clearly defined scope of work and expected quality of service standards. Additionally, the document should specify methods and procedures for performance measurement, along with monitoring and evaluation processes. Essential components also include remuneration and payment systems, communication protocols, and escalation procedures for dispute resolution. Finally, the MARC document should contain clauses for rewards and penalties, clearly outlined (Van Horenbeek et al. 2012). The MARC document is usually tailored in unique ways to meet the needs of the client. It could be a single contract, where different machines used for different functions are bundled together into one contract or separate contracts for specific or specialized machines (mobile or static machines separately) used for identical, diverse functions or services (Olivier 2008).

The instrument used for the management of a typical MARC relationship is known as a service level agreement (SLA). An SLA can be likened to the bill of quantities (BOQ) used for the execution of construction projects or out-tasking services in facilities management. While the expected services through the BOQ are described in specific units of quantity, in an SLA, the descriptions are in the terms of quality of service required. The document outlines the terms and conditions of service, including minimum quality standards and specified key performance indicators (KPIs). It also details performance measuring systems, workflow structures, and obligations with risk-sharing modalities. Additionally, it includes provisions for periodic reviews (Schütze 2017; Engel et al. 2022). As maintenance activities cannot be predicted correctly, the MARC process is fraught with uncertainties and challenges. Similarly, the SLA and the MARC relationships, are faced with inherent challenges, which border on the dynamics of the human factors, complexities of the machines in a typical mining operation, and the logistics and infrastructure supporting operations (Ben-Daya et al. 2009). Thus, success in a MARC relationship requires effective and dynamic synergy between the associated stakeholders, namely, the client, the service provider(s) and the OEM, to ensure a win-win relationship (Chipangamate et al. 2023).

1.1 Objective of the research

The objectives of this research are:

- To evaluate how service providers assess MARC documents and ensure that the relationship is mutual and profitable.
- To identify how the service providers categorize key drivers, concerns, and benefits of MARC relationships.
- To analyze the intricacies and implementation challenges in a typical MARC document that may impact profitability.
- To develop evidence-based recommendations for improving MARC document, within the Lifecyle of the relationship.

This paper is an excerpt from an ongoing larger research exercise that examined the factors required to ensure profitability for both, the client and service provider, through the MARC relationships. This paper commences with a general introduction, a review of relevant literature, a discussion of the research method, which outlines the research design, data collection and analysis, and research findings and discussion. Finally, a conclusion and recommendations are presented.

2. Literature review

2.1 The Maintenance and Repair Contract (MARC) Relationship

In the mining sector, the MARC document provides the contractual instrument for the relationship between the client and maintenance service provider for the management of the machines in the production line of the client organization. The OEM may be treated as a third party, or the maintenance service provider is an integral part of the OEM (Olivier 2008). The MARC document can be structured to include a bundle of different machines used for different functions, or a group of specialized machines used for identical or diverse functions. Currently, there is no single contract structure that ‘fits all’ the functions of the mining industry. Each mining organization is free to enter into a MARC

relationship with single or multiple service providers. A simplified definition of the MARC relationship, provided by Van Horenbeek et al. (2012), states that it is a legal agreement between two parties wherein one party agrees to maintain an asset that is owned by another party. The contract provides that the service provider (or OEM) guarantees the dynamic repair and maintenance of the allocated machines, ensuring their reliability and availability for the execution of the client's production. The contract document states clearly the scope of work, the quality and deliverables, performance measurement systems, remuneration, rights and obligations of all associated parties, rewards and penalties (Van Horenbeek et al. 2012).

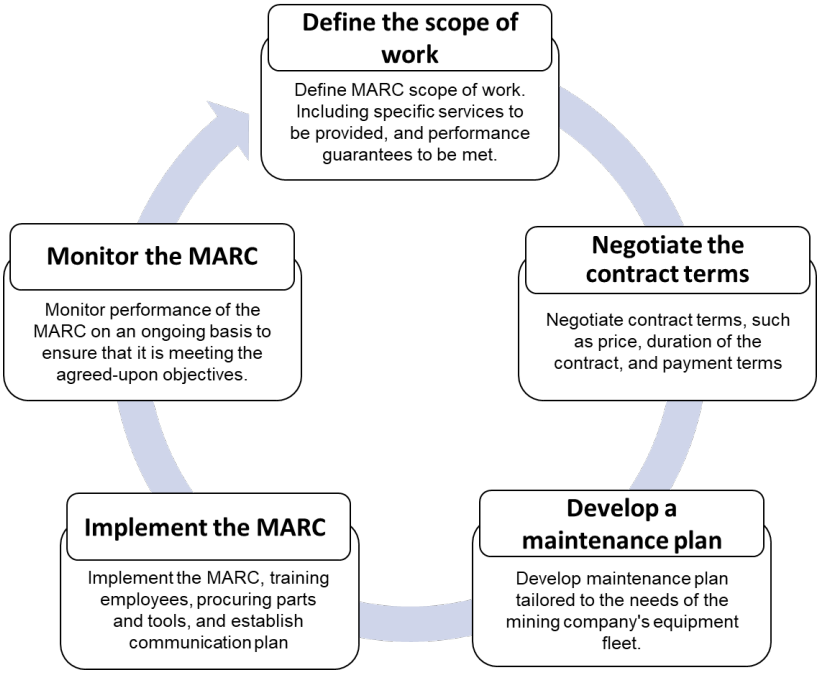

Figure 1. MARC implementation cycle

A typical MARC contract provides for a win-win relationship for the associating parties (Figure 1). To the service provider and OEM, it means a potential steady source of revenue, a steady market for the supply and use of genuine repair parts, enhanced performance of equipment sold, and promotion of the brand name of the OEM. Similarly, the steady availability and reliability of the operational machines in the production line mean profitability to the mining organization and continued business (Misra 2020). There are several variants of MARC relationships in practice. The most beneficial is the "full maintenance contract" (Biggemann et al. 2014). The contract entails all the elements of maintenance and repairs including preventative, corrective, parts supply, labour management and condition monitoring. It allows the client to concentrate on the core values of their organization, while the service provider concentrates on the support functions (its own core values) of ensuring functional machines in the production line of the client (Biggemann et al. 2014). The research efforts of Summit and Halomoan, (2015) and Misra (2020) summarised the benefits of implementing a MARC relationship as follows:

- Improved equipment performance and reliability: Better maintenance practices coupled with improved monitoring conditions and on-time repair improve equipment performance and reliability.
- Reduced downtime and increased productivity: Lower downtime and enhanced equipment availability lead to greater mine production and improved revenue for the mine.
- Enhanced cost management and optimization: Collaborative approaches allow for identifying potential cost-saving opportunities on maintenance costs and optimized spare parts management.
- Continuous improvement and innovation: Innovations in equipment performance and maintenance efficiency result from a culture of shared learning and continuous improvement that stimulates new approaches to maintenance practices.
- Risk mitigation and dispute resolution: Having a good relationship helps in developing effective ways of mitigating risks and addressing conflicts that could disrupt operations.

- Shared success and long-term partnership: Establishing a partnership based on mutual interest between associating parties can ensure the success of a MARC programme in the long run.

The operational model of a typical MARC relationship (Olivier 2008) is presented in Figure 1, showing a continuous circle of repeated processes, refined for continuous improvement through progressive performance measurement. Two critical factors (among others) worthy of consideration in the management of effective MARC relationships are the management of emerging challenges and stakeholders' relationships.

Equipment maintenance contracts come with their own wide range of unique challenges. That notwithstanding, the key point is to ensure an effectively managed mobile fleet for the client, based on standard principles and industry best practices. The tripod of challenges commonly experienced in a typical MARC relationship centre on people, machines, logistics and infrastructure. The effective management of these challenges determines the outcome or success of the MARC operation. A good maintenance practice provides multiple advantages. Similarly, poor maintenance management results in equipment failures, leading to major business and financial losses. Ben-Daya et al. (2009), observed that the 'people-related' factors include the need for trained and skilled personnel, adequate manpower in terms of quantity and quality, time management, using a manual process for data management, and budgeting issues. Similarly, the integral components of the machine, logistics and infrastructure should be explored and taken care of to enhance the prospect of the availability of the equipment in the production line.

The MARC framework cannot be realized or function effectively without the integration and interaction between the different parties in the relationship and being guided by established systems. It is imperative, therefore, to formulate a dynamic stakeholder engagement structure and stakeholder management strategies (Chipangamate et al. 2023). The focus of the stakeholders' relationship in MARC is not on driving organizational success but on achieving the common good of all parties in a win-win relationship (Chipangamate et al. 2023). This requires progressive synergy between the mining company (client), equipment manufacturer (OEM), and maintenance provider (contractor). According to Ngobese et al. (2023), the three key clusters in the MARC relationship are the client, OEM and the service providers. Each of these stakeholders has a different and specific field of expertise that is required to make a valuable contribution to the MARC system.

The relationship should be governed by collaboration, effective communication, open books, knowledge, information and vision sharing. This fosters integrity and trust amongst them and ultimately optimizes overall equipment performance, which increases productivity in the dynamic and demanding world of mining (Ngobese et al. 2023).

2.2 Instrument for Managing the MARC Relationship

The tool for managing a typical MARC relationship is known as an SLA. Wang et al. (2015), define an SLA as an agreement for outsourcing a relationship that defines the mutual understandings and expectations regarding a service between the service provider and the client. The document, according to Engel et al. (2022), outlines and sets the conditions of the services to be provided, describes the minimum performance criteria, quality and measuring system, clearly defined clauses for rewards and penalties, as well as other necessary obligations and risk-sharing modalities. Furthermore, a typical SLA document should include a dynamic workflow structure, the clauses for compliance, sustainability and resiliency (Schütze 2017).

A critical section in an SLA document is the section dealing with the service to be provided. The description of services to be rendered and the indicators that will be monitored, measured, and evaluated for each service should be clearly outlined. SLA documents are unique for different organizations and services. Some generic information and metrics in a typical SLA are briefly described (Lourenço et al. 2014).

- **Hours of Service:** Actual running time of the equipment in hours. Higher output levels translate to productivity. Therefore, the contractor should strive to maintain constant availability of the equipment within a MARC relationship.
- **Response Time**: The time is described as the time between when the service provider is aware of a maintenance request and when the request is addressed, which influences the length of the downtime of the machine. The effective management of the response time shortens the length of downtime and increases the reliability and productivity of the machine in the production network.
- **Deadline for Resolution:** The supplier must rectify any maintenance and repair within the agreed time. This enhances the deadline achievement, thus minimizing equipment downtimes.

- **Security Service:** The elements of risk associated with such security include internal and external threats that could compromise equipment on site and thefts. This can include digital security, such as an attack on the software embedded in the system's infrastructure and protocols.
- **Equipment Availability:** The high availability of mobile mining equipment affects productivity directly, which means that it is one of the most important factors for mining operations.
- **Performance:** The effectiveness of the mining equipment will be evaluated in relation to its intended function, based on operational speed, productivity and reliability.

As much as possible, the document should be comprehensive, with provision for periodic reviews and updates as well as the management of challenges.

Managing SLAs effectively for organizations with a wide range of machines and equipment presents several challenges. Broadly speaking, the challenges include the difficulties of using a generic SLA for all the machines in the fleet of the client or the bundle allocated to the service provider or developing separate SLAs for the different machines. In a typical mining industry, the different static and mobile mining machines have unique maintenance challenges. Therefore, developing suitable SLA documents is complex (Olander 2014). Thus, managing SLAs in a MARC relationship requires a proactive and strategic approach, effective collaboration between all stakeholders, and a willingness to adapt to changing circumstances, including the periodic review of the operational SLAs.

The panacea to the effective management of the challenges in SLAs requires a multidimensional approach, which includes flexibility in contract documents to accommodate changing needs and adjustments, effective stakeholder engagement, involving all relevant parties in decision-making, timely conflict resolution, encouraging objective feedback, fostering shared ownership and accountability (Comuzzi et al. 2010; Olander 2014). By adopting the principles of collaborative relationships, many of the emerging challenges in managing a successful SLA can be ameliorated and enhance the prospect of a successful MARC relationship.

From the literature reviewed, it was observed that comprehensive SLA and MARC documents significantly influence the effective operation and success of a MARC relationship. Therefore, the service providers must evaluate the content of the MARC document before entering the contract relationship, which was the focus of this research, evaluating the content of an operational MARC document to ascertain the concerns, benefits and profitability.

2.3 Research Gap

From the literature reviewed, three critical gaps exist in current MARC research: (1) Limited empirical studies examining MARC effectiveness specifically from service provider perspectives in mining operations, (2) Insufficient research on validated frameworks for evaluating mutual profitability and contract intricacies in MARC relationships, and (3) Lack of systematic analysis of operational drivers and concerns that influence service provider decision-making in MARC implementations. This research addresses these gaps through empirical investigation of service provider experiences and provides practical insights for improving the effectiveness of MARC relationship in the South African mining context.

3. Research Method

The case study strategy of qualitative research was considered the most appropriate for studying the quality of a typical MARC relationship from the perspective of the service provider, especially from an organization that has used the contractual instrument for a considerable length of time. A case study research strategy requires an intensive, in-depth, and purposive study of a small portion of a larger problem to understand the research scenario, make sense of the data collected, and proffer solutions to the research questions (Gerring 2004; Yin 2014). The exercise used an interview guide as the instrument to collect both qualitative and qualitative answer with numerical responses. The numerical responses were collected using the Likert scale 1-5 which was analysed by adopting the concept of mirror imaging of the Likert scale. This variant of the Likert scale allocates negative, zero, and positive numerical values to the nomenclature of the 1-5 on the scale. Where 1 and 2 bear negative integers, 3 bears the zero integer, while 4 and 5 bear positive integers. The importance of this approach is to avoid the tilting effects of the middle point, allowing participants to align positively or negatively with each factor of the research (Robertson et al. 2017). The Likert scale is a psychometric scale commonly used in survey questionnaires. The rating scale ranges from one to five, six to eleven, or entirely with odd or even number ranges (Allen and Seaman 2007; Pimentel 2010). In other scenarios, the scale 1-5 may assume positive integers, in ascending order from 1 to 5 or adopt the mirror image, where the middle number in the scale assumes a zero numeral (Pimentel 2010). Furthermore, Ogden and Lo (2012), observed that data

from Likert scales can be problematic, subject to faulty interpretation and application to real-life study; problematic, especially if the participants are not purposively selected. Unless there is a pre-qualification exercise before enlisting participants in research using the Likert scale, especially the linearly positive integers, many of the participants may not respond objectively. Consequently, their response could negatively affect the results. Respondents involved in an odd number Likert scale exercise may use the middle point response as a moderate standing or as a 'dumping ground' for unsure or non-applicable responses (Kulas et al. 2008). One of the most probable reasons why participants may choose the middle response could be to hide their ignorance, choosing to sit on the fence as the safest approach (Baka et al. 2012; Murray et al. 2016). In practice, the value allocated to the middle position plays a significant role in achieving the objective of the research.

The objective of this study was to evaluate the content of an operational MARC agreement to identify possible intricacies or ambiguities, concerns and benefits, that may impact on the relationship between the parties and the profitability of the service provider. In this regard, the interview questions used for data collection included open-ended questions and qualitative questions with numerical responses. Qualitative information was analysed using the principles of content analysis and the mirror imaging concept was used for the analysis of numerical information. A benchmark of 0.5 was chosen to assess the acceptable factors (Hall et al. 2016; Zhang et al. 2019). The benchmark was set high to enable the service provider to identify the key factors to look out for in the MARC document that would ensure a profitable relationship. The process of executing this research, the data analysis and the outcomes are described in the findings and discussion section.

4. Findings and Discussion

The organization identified and used for this research as the service provider is an integral part of the OEMs that supply earth-moving machines to the mining industry. A single site (organization) was used for this case study. The population was restricted to the strategic and tactical levels of leadership (the project engineer, maintenance engineers, finance manager, and workshop supervisors), where a sample of seven respondents was purposively selected. The interview questions, which were administered online, were divided into three parts. The first was the demographic information of the respondents, then open-ended questions, and finally qualitative questions that required numerical information as responses. This approach allowed for a thorough examination of the MARC document and the relationship it fosters between the client and the service provider to ensure that the outcome of the relationship is beneficial to both parties.

4.1 Data Analysis

The survey data collected from the participants were analysed in three components, namely, analysis of the demographic information, response to qualitative questions, and the response to the structured questions requiring a numerical response.

4.1.1 Analysis of demographic information

The first two questions sought to establish the educational qualifications and work experience of the respondents. Table 1 presents the information on the educational qualifications and work experience of the respondents. It shows that 6 out of the 7 respondents (85.7%) held a 4-year degree qualification (5 BSc-hons and 1 BTech) in mining-related fields of engineering. Only one respondent held a National Diploma. Similarly, 6 (85.7%) of the respondents have more than 6 years of working experience in the mining industry. This indicates that the respondents had adequate academic credentials and work experience to support their ability to provide informed insights on MARC implementation and benefits to the parties in the MARC relationship.

Table 1. Demographic information – service provider

No	Question	Respondents						
		1	2	3	4	5	6	7
1	What is your highest qualification?	4-year Degree (e.g. BSc-Hons	4-year Degree (e.g. BSc-Hons	4-year Degree (e.g. BSc-Hons	4-year Degree (e.g. BSc-Hons	4-year Degree (e.g. BSc-Hons	4-year Degree (e.g. BSc-Hons	National Diploma
2	How long have you been working in the mining industry?	6 – 10 years	1 – 5 years	11 – 15 years	11 – 15 years	11 – 15 years	6 – 10 years	11 – 15 years

The demographic information showed that the participants could address the research questions regarding the MARC document content and relationships. The cognitive prowess of research respondents is influenced by their educational qualifications and work experience, which are critical to their ability to respond objectively to research questions. This supports the observation that explicitly scoping the audience or purposive selection of research participants, "can increase the likelihood of quickly receiving many high-quality answers" (Teevan et al. 2011 p. 630).

4.1.2 Analysis of Open-Ended Questions

Questions 3 and 5 of the open-ended questions required a generic 'yes' or 'no' response, while in the follow-up Questions 4 and 6, the participants provided detailed information to buttress their yes or no responses. As shown in Table 2, the responses to Questions 3 and 5 are overwhelmingly yes.

Table 2. Ideas generated from participants' response

Question 3	3. In your experience, is the **maintenance and repair contract** for mobile mining equipment generally **beneficial** for the **service provider**?						
Response	1	2	3	4	5	6	7
	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Question 4	4. Based on the answer above, some additional context is provided below						
Response	Gain 100% of market share	Control over the life cycle cost	Secures the business for the service provider	KPIs like availability/ reliability are measured	Beneficial for service providers	Parts business locked to maintenance contract	Benefits both OEM and client
	Expand operations	Effective maintenance management	Proactive response	Both parties benefit significantly	Profitability depends on various factors	Good margins if life cycle costs aligned	Improves equipment reliability
	Develop more business through marketing	Risk shared with OEM	Provides reliable and available equipment			Benefit depends on scope of work	Provides consistent budgeting
Question 5	5. Is the **contractual relationship** between the service provider and mining client **profitable** for both parties in your current setup?						
Response	1	2	3	4	5	6	7
	Yes	Yes	Depends	Yes	Yes	Yes	Yes
Question 6	6. Based on the answer above, some additional context is provided below						
Response	Client focuses on mining	Guaranteed revenue for OEM	Contract management dependent	Machine availability key	Well-structured relationship	Generally profitable	Builds reputation and trust
	Service provider focuses on maintenance	Maximized asset availability	Shortcut avoidance important	Healthy equipment needed	Profitable with conditions	Challenge: price increase approvals	Quality service emphasis
	Rates set for mutual profitability	Better cost predictability	Machine availability crucial	Mutually profitable arrangement	Clear contractual terms	Initial agreement adherence	Customer satisfaction grows market

The synthesis of the ideas generated from the responses to Question 4 is summarized into four key benefits of the MARC relationship for service providers presented below.

- The prospect of operational expansion and control: Service providers can gain increased market share, expand operations, and maintain control over equipment life cycle costs.
- Provides business security and performance management: The contracts secure business, enhancing the use of the repair parts from the OEM. Adopting business and effective maintenance management, with

performance measured through KPIs, helps the service provider to ensure the availability and reliability of machines for production.
- Enhanced revenue and profitability: The MARC relationship offers potential for good profit margins, particularly when life cycle costs are properly aligned with the scope of work and provide dynamic budgeting adjustment, relative to prevailing inflation trends.
- Provides strategic partnerships: The MARC relationship helps to foster synergic relationships between the service provider, the OEMs and clients and allows for mutual risk sharing, improved equipment reliability, and proactive maintenance approaches.

These sets of benefits indicate that MARC relationships serve not only as a business mechanism but also as a strategic tool for service providers to establish sustainable, profitable, and operationally efficient relationships with mining clients. However, the prospect of operational expansion and control, business security, enhanced revenue and profitability as well as achieving strategic partnerships are dependent on the quality and consistence of service, which guarantees the reliability and availability of machine, as stipulated if the SLA document. This requires that the service provider should acquaint themselves with the information in the section for service providers, in the terms and condition of contract of the MARC document.

In the same sense, the detailed responses to Question 5 and the follow-up Question 6 suggested key factors that should drive the performance of the service provider to achieve client satisfaction and profitability of a MARC relationship, as follows:
- Focuses on areas of core value: Each party can concentrate on their areas of core value – the client concentrating on mining operations and the service provider on maintenance management.
- Provides long-term financial stability: Service providers receive guaranteed long-term revenue, while clients gain predictable maintenance costs and improved asset availability.
- Relationship value: A successful MARC helps to build reputation, trust, and reliability, leading to increased market share through customer satisfaction.
- Operational effectiveness: The use of clear KPIs enhances the prospect of machine availability, maintains healthy equipment maintenance, avoids shortcuts and ensures sustainable profit.
- Requires dynamic contract management considerations: Success resulting from a MARC depends on well-structured relationships, clear contractual terms, and proper handling of price fluctuation approvals.

This analysis indicates that while a typical MARC relationship provides profitable relationships, success depends on careful structuring, effective management, and ongoing commitment from both parties (Summit and Halomoan 2015; Misra 2020). In essence, the MARC document should be interpreted along with the relevant sections of the 'terms and conditions of contract' as well as the performance metrics stipulated in the SLA documents used for the outsourcing relationship. These instruments (MARC and SLA) should be used by the service providers to execute the outsourced tasks. Noting that the essence of outsourcing is to allow the client to focus on the areas of their core value and commit the support services to other agents. Similarly, the service providers, through the MARC relationship, provides support services to the client, in their areas of core values. This process allows the client to benefit from the specialized knowledge of the service provider (Lankford and Parsa 1999).

While many of the respondents observed that a typical MARC relationship is mutually profitable, one critical voice suggested that it "Depends". This divergent perspective underscores the need for the service provider to be knowledgeable about the details in the terms and conditions of the MARC document as well as the performance metrics provided for the measurement of performance in the SLA. Therefore, the service providers should demonstrate their skills in quality contract management and ensure they adhere to the performance standards provided in the SLA document. Furthermore, the prospect of profitability of MARC relationship is influenced by the time frame of the contract either short-term or long-term. Thus, the service providers should be mindful of the conditionality of the divergent perspective, which provides the important balance to the question of profitability.

4.1.3 Qualitative questions with numerical response

The structured Questions 7, 8, and 9 required numerical responses and further sought to evaluate the typical MARC relationship, its benefit and profitability to the service provider. Several factors were evaluated to assess the perception of the service provider. The numerical response was based on the Likert scale of 1–5, where the nomenclatures 1-5, were redesignated as 1= -4; 2= -2; 3= 0; 4= +2 and 5= +4. Adopting this approach facilitates the ability to achieve the

mirror image of the analysis, because the middle point value is zero (Pasipatorwa et al. 2022). The analytical process assumes that all (seven) participants rated each factor at the highest integer of the Likert scale 5, which is now designated as +4. The weighted score becomes 4X7 = 28. Therefore, the weighted average for each factor is obtained by dividing the arithmetic sum of the scores for each item by the weighted score, as shown in Equation 1.

Weighted average for each factor: $X = [(-4xn_1) + (-2xn_2) + (0xn_3) + (2xn_4) + (4xn_5)]$/Weighted score (1)
Where n_1 represents the number of participants who rated the factor as 1, similarly, n_2, n_3, n_4, and n_5, represent the number of participants who rated the factor accordingly.

Example factor 7.1.
Weighted average for factor 7.1= [0 x 2 + (2 x 3) + (4 x 2)]/28
= [0 + 6 + 8]/28
= 14/28
= 0.50

This approach was used in calculating the weighted average for each of the factors shown in Tables 3, 4, and 5. The weighted average of 0.5 was chosen as the benchmark for accepting suitable factors.

Table 3. The drivers of MARC relationships

S/No	Factors	Responses							Total	Weighted average
7.	What are the **key drivers** the service provider and/or OEM must consider before offering maintenance and repair contracts for mobile mining equipment?									
		1	2	3	4	5	6	7		
7.1	Market Demand & Client Needs	3	3	4	5	4	5	4	14	0.50
7.2	Service Capability & Resource Availability	4	4	5	4	4	5	5	20	0.71
7.3	Contract Structure & Pricing Model	5	4	4	5	4	5	4	20	0.71
7.4	Legal & Regulatory Considerations	4	4	4	5	3	5	5	18	0.64
7.5	Risk Management & Performance Guarantees	4	4	4	5	3	4	4	14	0.50
7.6	Data Management & Reporting	4	4	5	5	3	5	5	18	0.64
7.7	Logistics & Infrastructure Support	4	4	4	5	4	5	4	18	0.64

As shown in Table 3, all seven factors met or exceeded the benchmark score of 0.5, indicating that the respondents considered each of these drivers essential for a successful MARC relationship. The factors can be divided into three clusters and classified as high, moderate and low drivers. Thus, service capability, resource availability and contract structure, along with pricing models are high drivers. Next in rank are legal and regulatory considerations, data management and reporting as well as logistic and infrastructure support. The low but equally important drivers are market demand and client need as well as risk management and performance guarantees.

The quality and comprehensiveness of a MARC document enable the service provider to align his performance with the metrics provided in the SLA and meet the expectations of the client. In the MARC document reviewed in this research, the service provider rating these factors high, suggests that the contractor is satisfied with the content of the provisions in the contract document. This is because the service provider sees the MARC document as a win-win relationship, challenging the contractor to give his best performance and deliver effective maintenance services (Chipangamate et al. 2023).

Table 4. Key concerns and drawbacks

S/No	Factors	Responses							Total	Weighted average
8.	What are the **key concerns and/or drawbacks** you have about the maintenance and repair contract from a service provider and/or OEM perspective, if any?									
		1	2	3	4	5	6	7		
8.1	Fixed pricing vs. actual workload	4	4	3	3	3	4	5	10	0.36
8.2	Dependence on client satisfaction and payment	4	2	3	2	3	4	4	2	0.07
8.3	Potential scope creep and unforeseen requests	3	3	2	2	2	5	5	2	0.07
8.4	Contract renewal uncertainties	5	3	4	1	4	4	2	4	0.14
8.5	Potential liability and legal disputes	3	3	3	1	4	4	4	2	0.07
8.6	Attracting and retaining skills	4	3	5	3	4	4	5	14	0.50
8.7	Difficulty in managing multiple contracts and locations	5	3	3	3	4	4	4	10	0.36
8.8	Dependence on the client's infrastructure and resources	2	4	3	3	3	5	4	6	0.21
8.9	Limited access to client decision-makers	2	4	4	4	3	5	5	12	0.43

Interestingly, in Table 4, all the factors measured, except one, fell below the benchmark. This suggests that if the service provider performs their obligations in the MARC relationship, using the standards provided in the SLA and adopting the criteria identified in the earlier question, there should be no major concern or drawback in the relationship. However, the issue of attracting and retaining a skilled workforce is an important concern due to the shortage of skilled workers and high labour turnover in the mechanical maintenance profession. Skill shortage and retention have continued to be a real concern in outsourcing relationships generally (Lankford and Parsa 1999). To ameliorate this challenge, Oliver (2008) suggested an abridged form of in-house training, sponsored specialized training with the provision for ‘bond’ periods (where the trained staff will serve the organization for specified periods), depending on the class and the length of the training periods.

Table 5. The benefits of MARC relationships

S/No	Factors	Responses							Total	Weighted average
9.	In your experience, what are the **benefits** of using maintenance and repair contracts in a mining operation from a **service provider** and/or **OEM** perspective?									
		1	2	3	4	5	6	7		
9.1	Potential for increased parts sales	5	4	5	5	4	5	5	24	0.86
9.2	Increased revenue and market share	5	4	4	5	4	5	4	20	0.71
9.3	Long-term client relationships	5	4	3	5	4	5	5	20	0.71
9.4	Improved capacity utilization and resource allocation	5	4	3	5	4	5	5	20	0.71
9.5	Data-driven insights and service optimization	5	4	5	5	4	5	4	22	0.79
9.6	Brand reputation and industry expertise	5	4	4	5	4	5	5	22	0.79
9.7	Potential for upselling and service expansion	5	4	4	5	3	5	5	20	0.71
9.8	Improved equipment performance and lifespan	5	4	5	5	3	5	5	22	0.79
9.9	Quality control and brand protection	5	4	5	5	3	5	5	22	0.79

Drawing inferences from Table 3, where the factors scoring a weighted average of 0.71 were considered as a high priority, all nine factors, measured in Table 5 as the benefits of a MARC relationship for the service provider, were rated above 0.71. This suggests that the MARC document evaluated by this service provider was beneficial in every respect as a win-win relationship for all the stakeholders (Summit and Halomoan 2015; Misra 2020). Furthermore, it is worth noting that factors such as 1, 6, 7 are 9 benefit the OEM, while a factor such as 8 benefits the client and factors 2 to 5 benefit the service provider. The importance of service flexibility is a win for all the parties in the relationship, while stable revenue generation benefits the OEM and service providers directly, encouraging them for improved service, which benefits the client. These findings further reinforce the strategic value of a MARC relationship to the parties in the relationship, especially the service provider.

While the findings demonstrate substantial benefits of MARC relationships, a comprehensive evaluation requires critical examination of latent risks, implementation difficulties, and potential failure points that can undermine effectiveness of a MARC relationship. This balanced analysis addresses the challenges that organizations must navigate to achieve successful MARC outcomes. Although the challenges of skill shortage have been identified, but when there is a regular stream of adequate workforce, the effectiveness of the workforce management is a potential latent risk that may impact negatively on effective operations (Ben-Daya et al. 2009). Similarly, the quality of communication system and the challenges of infrastructure dependencies contains latent risks that the service provides should anticipate and develop suitable alternatives. When there is a breach in the communication systems, it creates delay in problem resolution, impacts of the prospect of escalating the process of conflict resolutions, reduce the capacity for collaborative problem-solving of the stakeholders (Ben-Daya et al. 2009). When the communication default is within the organization of the service provider, it results in the misalignment of operational and strategic levels. This disconnect coupled with any challenge with the operational infrastructure could result into service delivery delays, equipment availability and negatively affect client satisfaction (Warrington et al. 2016). In a typical MARC relations, the service providers are dependent on some client's infrastructure and resources, such as electricity supply, crane services and workspace. Inadvertent delay or disruptions experienced in any or combination of the infrastructure and resources creates vulnerabilities to the service providers.

Another risk factor worth considering in MARC relationship is the financial vulnerabilities of the service providers. The three possible sources of this financial vulnerability on the service providers emanates from poor definition and ambiguities in scope creep, price escalation, inflation and cost management, as well as the risks of effective management of performance guarantee (Wang 2010). Similarly, some potential failure points in a MARC relationship includes inadequate provisions for contract review mechanisms, technology and system integration challenges. To ameliorate these potential failures, the MARC documents should be reviewed regularly, adopt suitable CMMS that can be easily adaptable between client and service provider and pursue the practice of contextual system upgrades (Uriarte et al. 2019). This will enhance effective data management system, which will facilitate progressive performance monitoring and evaluations (Schütze 2017).

In a nutshell, the comprehensive evaluation of a typical MARC relationships, espouse the stakeholders to the significant benefits and the inherent risks that requires careful management and proactive problem-solving approaches. Therefore, a well-crafted and dynamic MARC relationship provides mutual benefits to all the parties involved in the relationship (Chipangamate et al. 2023).

6. Conclusion and Recommendations

The focus of this research was to evaluate the quality content of a MARC document for the repair of mobile earth-moving machines in the fleet of a mining client, by the service provider, to identify the drivers, concerns, benefits, profitability and risks of the relationship. This MARC relationship was limited to the mobile earth machines. This suggests that the client has MARC relationships with other service providers for other machine types or functions. The case study strategy of qualitative research was considered the most appropriate method for the research. The single site (organization) was chosen as the population for the research, where a sample of seven participants was purposively selected for data collection. The interview guide was divided into three parts, namely, the demographic information, open-ended questions, and qualitative questions requiring numerical responses. Each of the three segments of data collected was analysed and discussed progressively, along with the MARC and SLA documents, adapting the principles of triangulations.

The demographic information of the participants showed that the respondents were at the strategic (managerial level) and tactical (engineers and supervisors) levels. The majority have a bachelor's degree in mining and related engineering fields, with over six years of working experience in the maintenance of mining equipment. The educational background and work experiences gave credibility to the quality of responses to the interview questions. The open-ended questions that followed sought to establish if the MARC relationship was beneficial and profitable to the service provider. The response was an overwhelming 'yes'. The respondents encapsulated the benefits of the MARC relationship as the prospect of operational expansion and control, provision for business security and performance management, enhanced revenue and profitability, as well as opportunities for strategic partnerships. Similarly, they observed that profitability is enhanced by focusing on areas of core value, long-term financial stability, and valued relationship, occasioned by operational effectiveness using suitable KPIs and dynamic contract management. It important to note that although MARC relationship could be profitable to all stakeholders, the service

providers need to be fully acquainted with the details in the document and the measuring tools in the SLA. Furthermore, the success could be influenced by the timeframe for the contract and the effective management of associated risks.

Introspecting, the participants concluded that the drivers or motivations to participate in a MARC relationship are the quality and content of the MARC documents, which provide for service capability, resource availability and contract structure, along with the pricing model, detailed legal and regulatory considerations, data management and reporting as well as logistic and infrastructure support. Others include market demand and client need, risk management and performance guarantees. The only concern identified as a drawback in participating in a MARC relationship was the issue of skill shortage. Though potent, it is a general problem in the different industries in South Africa and not considered peculiar to the service providers in the mining industry.

In conclusion, the findings revealed that well-crafted and dynamic MARC documents provide mutual benefits in a win-win relationship for all the stakeholders. This result confirms that the MARC document evaluated by this service provider was beneficial and profitable.

The synthesis of information gleaned from the response of the service provider provides key recommendations on how to continuously improve MARC documents and the effective management of future relationships applicable to all the stakeholders as follows:

- Develop a comprehensive contract scope and management document.
- Adopt effective communication and user-friendly reporting systems.
- Deploy performance measurement tools and technology.
- Provide adequately resourced personnel and a flexible operation system.

It is hoped that these recommendations will collectively create a more efficient, adaptable and mutually beneficial MARC relationship.

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