

Measuring the Return on Investment for AFRICOM's African Enlisted Soldier Development Efforts

Jacob Bochonok¹, Meaghan Carroll¹, Paul Manfredini¹, Delilah Wood², and Matthew Dabkowski¹

¹Department of Systems Engineering, United States Military Academy, West Point, NY 10996, USA

²Department of Mathematical Sciences, United States Military Academy, West Point, NY 10996, USA

Corresponding author's Email: jacob.bochonok@westpoint.edu

Author Note: Cadets Bochonok, Carroll, Manfredini, and Wood are seniors at the United States Military Academy (USMA) participating in a year-long capstone design course under the direction of Colonel Matthew Dabkowski. In May 2020, they will commission into the United States Army as Second Lieutenants in the Engineer, Aviation, and Chemical branches. The client for their project is the United States Africa Command (AFRICOM), and the team is thankful for AFRICOM's steadfast support and assistance throughout the project, especially its Command Senior Enlisted Leader and its African Partner Enlisted Development Planner.

Abstract: In 2018, AFRICOM published its Africa Enlisted Development Strategy (AEDS). Built on the premise that professional militaries provide stability, the AEDS stresses the need to invest in the training of Africa's enlisted soldiers. Given strained defense budgets, it also acknowledges resource constraints, implying investments should be directed at partners and activities with high-payoff potential. Currently, AFRICOM does not have a system for measuring the return on investment for its efforts in training the enlisted soldiers of its African partners. This shortcoming not only limits AFRICOM's ability to identify new enlisted development opportunities but also hampers its ability to assess ongoing efforts. The Enlisted Development Maturity Level (EDML) scale discussed in this paper provides an intuitive, efficient mechanism to fill this void. Built on a simple 0 to 6 scale, the EDML captures the degree to which a country develops, trusts, and ultimately empowers its non-commissioned officers.

Keywords: United States Africa Command, Africa Enlisted Development Strategy, return on investment, Systems Decision Process, Enlisted Development Maturity Level scale.

1. Introduction

AFRICOM's mission is to counter transnational threats and malign actors, strengthen security forces, and respond to crises in order to advance the United States' (U.S.) national interests and promote regional security, stability, and prosperity (United States Africa Command, n.d.). A key effort in advancing this mission is the Africa Enlisted Development Strategy (AEDS). Through the AEDS, the U.S. military is working with African enlisted military personnel to attain short-term capabilities for security forces and achieve sustainable and enduring effects for partner nations in Africa (United States Africa Command, 2018).

1.1 Background and Customer Need

With just 5,200 U.S. Department of Defense personnel on the continent at any given time, AFRICOM's limited forward presence requires a focused effort to most effectively support partner nations in developing their professional militaries to achieve mutual security goals. One of the means in which the U.S. is attempting to strengthen its African partners is the AFRICOM AEDS. Functionally, AFRICOM is the organization in charge of maintaining professional military relationships with African partners, coordinating strategic military operations in Africa, and upholding military commitments while deterring potential threats. The purpose of the AEDS is "to develop and execute a regional plan for the professional development of African forces by identifying centers of excellence, providing intellectual support for those institutions, and developing lasting relationships with our partners" (United States Africa Command, 2018, p. 4). AFRICOM is attempting to attain short-term capabilities for security forces and achieve sustainable and enduring effects for the nations it supports (United States Africa Command, 2018).

There are many obstacles to the promotion of professional development of African enlisted forces. These obstacles include corruption, a legacy of colonialism, politicization of the military, militarization of politics, lack of empowerment, lack of education, and lack of collaboration across the continent. Many demographic factors about the African continent also make it problematic, including the youth bulge, lack of job opportunities, and lack of security (United States Africa Command, 2018). All of these issues affect Africans and create a lack of qualified soldiers to become non-commissioned officers (NCOs). The AEDS regionalizes professional military education and professional development in Africa through enabling African militaries to contain threats, eliminate violent extremist organizations, protect their borders, and instill faith in the safety of its citizens (United States Africa Command, 2018). AFRICOM and African Senior Enlisted Leaders identified four countries – Liberia, Ghana, Malawi, and Botswana – to spearhead the regionalization strategy for Professional Military Education in Africa. These countries are referred to as the Tranche 1 countries, and they were chosen due to their stable governance, NCO empowerment, and trust between officers and NCOs (United States Africa Command, 2018). The U.S. has put a large amount of effort into bolstering partner nations using the AEDS but is currently unable to measure the effects of the investment. This problem is not isolated to AFRICOM. Despite recognizing its importance, the U.S. Army lacks a concrete, universally accepted method for measuring ROI (Department of the Army, 2018). This shortcoming not only limits AFRICOM’s ability to identify new enlisted development opportunities but also hampers its ability to assess ongoing efforts. The AEDS return on investment (ROI) system proposed in this paper should allow AFRICOM’s Command Senior Enlisted Leader (CSEL) to be better informed regarding the utility of efforts in Africa, as well as where future efforts may be most effective.

1.2 Methodology

The Systems Decision Process (SDP) is a methodology that uses systems engineering tools to identify, scope, and solve complex problems. The SDP is shown graphically in Figure 1 and is comprised of four phases: problem definition, solution design, decision making, and solution implementation (Parnell, Driscoll, & Henderson, 2011, pp. 281-282). As Figure 1 shows, each phase includes subphases which identify tools that can be utilized to achieve the desired outcome of the phase. The SDP also includes external environmental factors that bear on the problem. Stakeholder input is solicited early in the SDP’s problem definition phase, and it plays a key role throughout the SDP due to the needs and recommendation portions of the process.

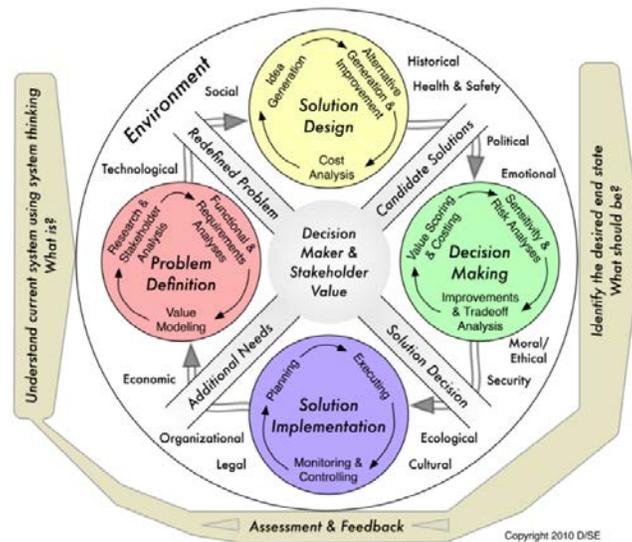


Figure 1. Systems Decision Process (Parnell, Driscoll, & Henderson, 2011, pp. 281-282)

2. Problem Definition

The team conducted extensive background research and stakeholder analysis regarding the AEDS, ROI, foreign military influence, and the four Tranche 1 countries. The literature review consisted of the following topics: AFRICOM’s development of African NCOs; Chinese and Russian military influence in Africa; the history, organization, and structure of the Tranche 1 countries’ militaries; and measuring the ROI for military training and development. Many professionals with

experience training NCOs and African partners were interviewed, including the Command Sergeant Major of the United States Military Academy, the director of the African Military Education Program (AMEP), and AFRICOM’s African Partner Enlisted Development Planner. These interviews provided key insights into the complexity of the systemic issues facing African NCOs.

Using this stakeholder analysis and the SDP, the team determined its fundamental objective was to create a system to measure the ROI of AFRICOM’s efforts to develop the enlisted soldiers of African militaries. From this fundamental objective the team created a qualitative value model of the system, and it focused the majority of its efforts on Function 3.0 – Develop analytics to determine the ROI of AFRICOM’s enlisted development efforts. As seen in Figure 2, below this function are subfunctions with associated objectives and tied to each objective is a value measure. This model was used to discuss desired qualities of the system with the client, as well as prioritize value measures in order to design solutions that effectively addressed its needs. For additional information on qualitative value models and their structure see Parnell, Driscoll, and Henderson’s *Decision Making in Systems Engineering and Management* (2011, pp. 327-331).

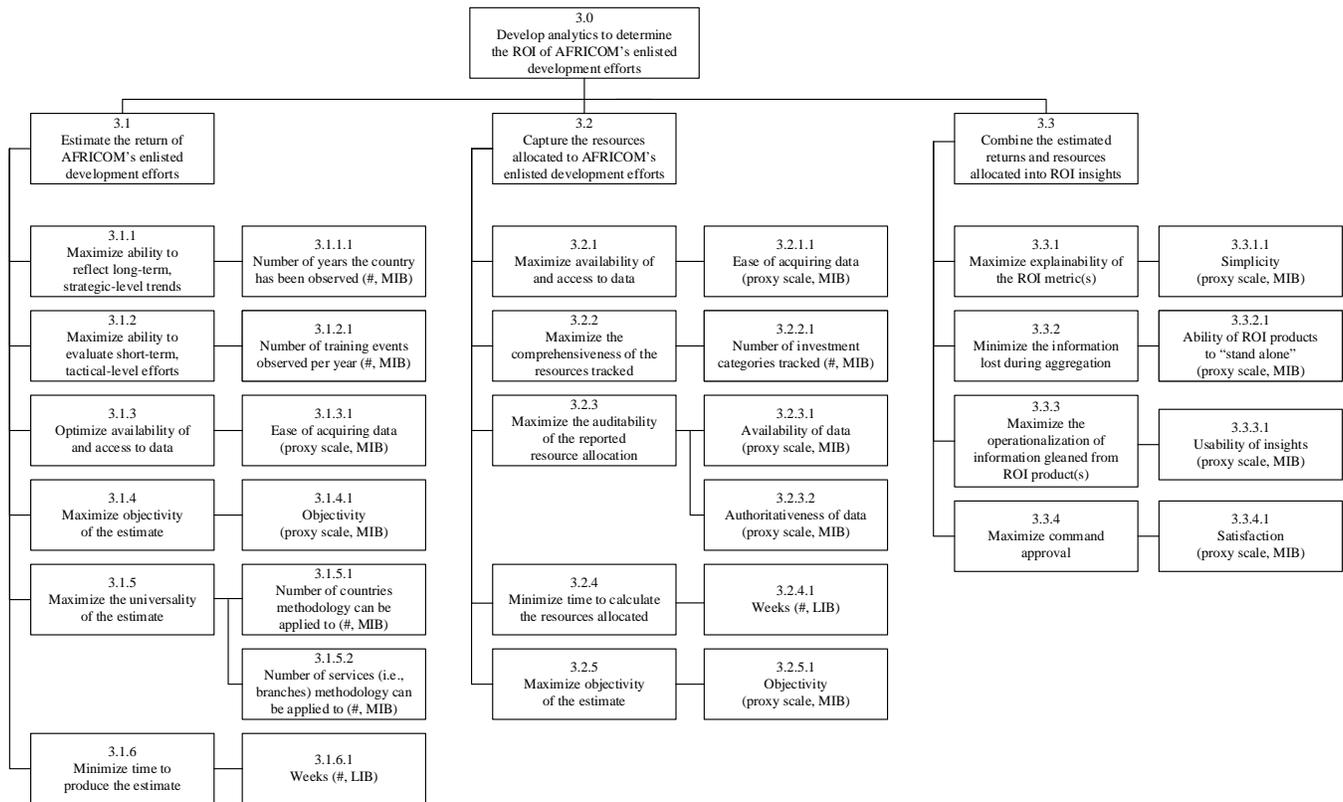


Figure 2. Function 3.0 of the Qualitative Value Model

3. Solution Design

The next phase of the SDP is solution design. This phase starts with the redefined, approved problem statement, and its outputs are candidate solutions, which are created through idea generation, alternative generation and improvement, and cost analysis. Zwicky’s Morphological Box is a tool used to create different candidate solutions through the combination of various system components (Parnell, Driscoll, & Henderson, 2011, p. 362). The Zwicky’s Morphological Box used for creating a system to measure the ROI of AFRICOM’S enlisted development efforts is given in Figure 3.

How to apply the EDML scale	How to assess EDML	How to measure investment	How to calculate ROI	How to present findings
National-level: Calculate a single EDML estimate for each country	Data-driven: Use short, mid, and/or long-term methods to estimate EDML	Money: DoS and DoD dollars spent on training programs and trainees	Long-term: Overall change in EDML over time given a cumulative investment amount	Numbers: Numerical results from mathematical model(s)
Service-level: Calculate separate EDML estimates for each branch of a country's military	DoS expert opinion: Ask embassy personnel to estimate EDML	People: AFRICOM personnel allocated to training programs in Africa	Long-term + short-term: Long-term, as well as recent effects or impacts of specific investments	Figures: Plots of results from mathematical model(s)
	DoD expert opinion: Ask AFRICOM personnel to estimate EDML	Events: Number of AFRICOM training programs in Africa		Maps: Geospatial representations of results from mathematical model(s)
	DoS + DoD expert opinion: Ask embassy and AFRICOM personnel to estimate EDML	Time: Hours spent creating and operating training programs, as well as training African soldiers		Text: Qualitative narratives describing return on investment
		Combo II: Money + People		Combo 1P: Numbers + Maps
		Combo 2I: Events + Time		Combo 2P: Maps + Text

Figure 3. Zwicky's Morphological Box

As seen in the first two columns of Figure 3, the Enlisted Development Maturity Level (EDML) scale plays a prominent role in assessing the return of AFRICOM'S enlisted development efforts. Created from scratch, this tool can be used by observers to categorize the enlisted development of an African partner's military and is based on the Capability Maturity Model used in software engineering (Paulk, Curtis, & Chrissis, 1991). Initially, the EDML scale had 6 levels (0 to 5). However, after sending it to the Tranche 1 countries' embassies for feedback, it was reconstructed to include 7 levels (0 to 6) that identify situations where NCOs are empowered and leveraged yet not trusted to provide input on decisions. The current, approved version of the EDML scale is shown in Figure 4.

Enlisted Development Maturity Level (EDML) Scale			
0	Country has no interest in NCO development; there is no trust between Officers and NCOs.	4	Country empowers and leverages NCOs at the operational level, but they are not trusted enough to provide input on operational decisions.
1	Country has interest in developing NCOs, but it does not have any developmental programs in place.	5	Country empowers and leverages NCOs at the strategic level, but they are not trusted enough to provide input on strategic decisions.
2	Country understands the value of developing NCOs and sends them to developmental programs, but it does not leverage them effectively.	6	Country's NCOs are empowered, leveraged and trusted in a manner similar to the U.S.; NCOs are the <i>backbone</i> of their country's military, and they are trusted to provide input on strategic decisions.
3	Country empowers and leverages NCOs at the tactical level, but they are not trusted enough to provide input on tactical decisions.		

Figure 4. EDML Scale

Levels 0 to 2 of this scale consist of criteria determining whether or not the country has developmental training programs in place. Levels 3 to 6 are then distinguished by the amount of empowerment and trust placed in NCOs who have attended training programs. Each level is broken down further to provide examples and articulate what is required for an African military to achieve a given EDML, ensuring consistency across assessors and providing standardization in the assignment of a level. Armed with a formalized metric and a repeatable process, the EDML scale can provide valuable insights into the potential return of AFRICOM'S enlisted development efforts.

In addition to the EDML scale, a framework for different evaluation methods was also created. These evaluation methods are time-based and consist of short-, mid-, and long-term time requirements. These methods are shown in Figure 5.

<u>Short-term</u>	<u>Mid-term</u>	<u>Long-term</u>
<ul style="list-style-type: none"> • Time requirement: Days / weeks • Data to inform ROI: Tests taken by trainees before and after a training program; AARs about the effectiveness of a training program immediately after its completion • Subject to be studied: African soldiers, individual-level training programs, and soldier-level impacts • Observers: Embassy personnel • Collection method: Physical 	<ul style="list-style-type: none"> • Time requirement: Months • Data to inform ROI: Key leader engagement AARs; observations of units (e.g., number of NCOs that attend key leader meetings, autonomy/trust of NCOs within units, application of the skills learned in training programs to the trainee’s unit, etc.) • Subject to be studied: African military units, local policies and TTPs, and unit-level impacts • Observers: AFRICOM and Embassy personnel • Collection method: Physical and digital 	<ul style="list-style-type: none"> • Time requirement: Years • Data to inform ROI: African military assessments; application of skills learned in training programs across the force; development and implementation of doctrine; infrastructure • Subject to be studied: African militaries, culture, and service-level impacts • Observers: AFRICOM and Embassy personnel; African military units • Collection method: Digital

Figure 5. Short-, Mid-, and Long-term Evaluation Methods

As seen in Figure 5, the guiding factors of the various evaluation methods are the metrics used to measure ROI, the subject to be studied, the observer, and the collection method. The short-term method can be used to measure a trainee’s improvement using a test taken before and after a training event, as well as After Action Reports (AARs) conducted following training. The mid-term method is conducted by analyzing Key Leader Engagement AARs, as well as observation data from several months following a training event. The final approach, the long-term method, is conducted over multiple years and utilizes evaluation reports, promotion data, and the number of times a soldier has applied the knowledge they have gained from a training event to his unit. Overall, the short-term method requires the least amount of resources but may yield the least accurate ROI estimates, whereas the long-term method requires the greatest amount of resources but has the potential for providing the most accurate and holistic picture of ROI. The EDML, in congruence with the short-, mid- and long-term evaluation methods, should aid AFRICOM in measuring the ROI of its various enlisted development training efforts.

Armed with an understanding of the EDML and evaluation methods, we return to the Zwicky’s Morphological Box seen in Figure 3. Components specific to this system are how to apply the EDML scale, how to assess EDML, how to measure investment, how to calculate ROI, and how to present findings. Through the combination of various components, three potential candidate solutions were created. For example, Solution 1 will apply the EDML scale to each branch of a country’s military by seeking the expert opinion of embassy and AFRICOM personnel. Investment will be measured as money spent on training programs and trainees. ROI will be calculated as the overall change in EDML given a cumulative investment amount, and these findings will be presented geospatially as a map with an accompanying qualitative narrative. After discussing these potential candidate solutions with AFRICOM, it was decided to pursue Solution 1 due to its ability to provide AFRICOM with immediate, actionable feedback.

4. Decision Making and Implementation

In order to develop and assess alternatives for Solution 1 and make a final recommendation, the team will construct a quantitative value model from the applicable elements of Function 3.0’s qualitative value model (see Figure 2). This quantitative value model will then be used to assign a value score for each alternative solution, and the highest scoring alternative will be recommended to AFRICOM.

Given Solution 1’s requirement to geospatially present the overall change in EDML over time for a cumulative investment amount, the team prototyped the R Shiny app seen in Figure 6. This app graphically displays the past and current EDML ratings of each country’s services, as well as the past and current amounts of investments made in each service. The two-paneled interactive map provides AFRICOM with a holistic picture of the continent and an in-depth, country-level look at the current status of enlisted development. Of course, as more information becomes available, this alternative will be updated and others will be developed. This is due to both the iterative nature of the SDP as well as the dynamic nature of the problem.

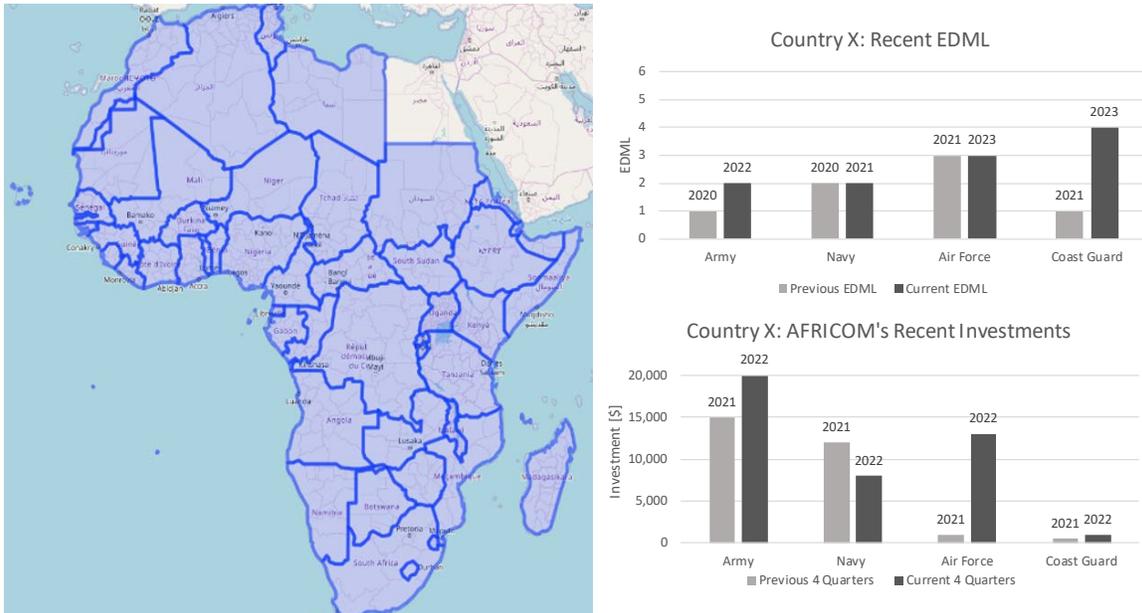


Figure 6. Prototype of Interactive ROI Application (Note: Data is notional.)

5. Conclusion

Every year AFRICOM commits substantial time, money, and resources into developing African NCOs, yet it lacks a formal means to measure the return on these investments. Understanding this deficiency, AFRICOM asked the team to develop a system to measure the ROI of its enlisted development efforts, and this paper describes a solution and the method used to develop it. Specifically, leveraging the SDP as a framework, the team utilized value focused thinking to develop the EDML along with means to assess and present it. AFRICOM provided positive feedback on the EDML and has given the team permission to forward it to each of 53 countries falling within its area of responsibility. Ultimately, iterating through this process over time will provide AFRICOM with a defensible, repeatable way to assess ROI, thereby improving its ability to professionally develop the NCO corps of African militaries.

6. References

- Department of the Army. (2018). Fiscal Report 2018 United States Army Annual Financial Report, Washington, D.C.: https://comptroller.defense.gov/Portals/45/Documents/afr/fy2018/Military_Services/2018_AFR_Army.pdf
- Parnell, G. S., Driscoll, P. J., & Henderson, D. L. (2011). *Decision Making in Systems Engineering and Management* (2nd ed.). Hoboken, NJ: Wiley.
- Paulk, M. C., Curtis, B., & Chrissis, M. B. (1991, August). *Capability Maturity Model for Software*. Pittsburgh, Pennsylvania: Software Engineering Institute, Carnegie Mellon University.
- United States Africa Command. (n.d.). Retrieved February 29, 2020, from <https://www.africom.mil/>.
- United States Africa Command. (2018, October). *Africa Enlisted Development Strategy*. Stuttgart, Germany: United States Africa Command.