THE MATHEMATICS OF COMMUNICATION

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Abstract—This paper discusses strategic communication as a math that, if executed well, can lead to sustainable development. It highlights the comparative analysis between traditional communication models and modern trends, whilst drawing out and dissecting influencing factors. The proposed mathematical formula is supported with case studies that justify its consistency and dependability.

Keywords—Communication for development, Communication Theories, Innovation and Strategy.

I. INTRODUCTION

A LOT has been written in the arts about communication and strategy. However, there is not sufficient literature on their science [1] or, for this matter, math. Needless to say, one cannot talk about facts and figures without placing them in context. This paper examines strategic communication mathematically—pursuing sustainable development as the end goal.

II. THE FORMULA

Assuming strategic communication is a formula derived from the equation:

\[ sc = s * c \]  

(1)

Where \( s \) represents strategy and \( c \) represents communication; And sustainable development is:

\[ ed = e * d \]  

(2)

Our problem then becomes to align the formula into the representation:

\[ sc = ed \]  

(3)

III. THE PROBLEM

The biggest challenge facing developing countries in Africa is sustainability, be it in the pursuance of new economic policies or completion of ongoing investment projects, a conundrum termed as backlog [2].

Strategy on the other hand, dominates all political and socio-economic dialogues, that it is now invariably a sing-song among key-decision makers. The necessity thus lies in effectively transmitting envisioned plans across the three communication problem levels [3].

IV. CORRELATION

Definitions:

a) Strategic Communication

b) Sustainable Development

Figure. 1 Defining determinants of Strategic Communication [4]

Figure. 2 Sustainable Development simplified [5]

In both illustrations, notice that set “goals y”, is a constant, implying that for strategic communication and for sustainable development to be successful, there must be a clear set of targets, so to speak.

V. CASE IN CONTEXT
It can be rightly argued that strategic communication is a prerequisite for effective policy making which in turn impacts sustainable development [6] and should be more prominent in the early stages of developmental planning [7].

Although strategic communication is sometimes seen as an external element contributing to change of policy, as was the case with Malala [8], this should not be the brick rule. In fact, communication is not simply a one way process, where the sender disseminates information without necessitating feedback – it is two way, and a good national development plan factors this into account [9].

From this explanation, we can derive theorem properties of strategic communication, namely;

\[ f(f - 1(x)) = x \]  

\[ (x, y) = f(x, y) \]

a) It is binary, as in, the information flow represents a binary digit or a bit. Thus, it can be mathematically represented logarithmically to the base of two

b) It is continuous, as in, the strategy has to be reinforced over a period of time, perhaps not in the same manner, but for the same purpose

c) It is complementary, as in, considered a catalyst for the success of an initiative, be it managing a project, or implementing policy

d) Its communication functionality is inversely complementary [9], as in, decoded converts to encoded, and is written as;

\[ ed = f([y, t] \cdot [n, t]) \]  

There are a myriad of other schools of thoughts [13] in regards to the functions and properties of time. However, the ones stated above are relevant to our flow of discussion.

As previously indicated, “innovation n” plays a major role in the success of sustainable development, which in turn is predetermined by the scope of “time t” mapped out. On this premise, sustainable development can be mathematically expressed as below:

China, the world’s second economy, understood this formula twenty years ago. Its policy makers recognized the need to invest in research and development (R&D) while planning for the foreseeable future. It is why they are at the forefront of innovation and can strategically enter a market knowing the estimated return on investments (ROIs) and setting their targets to reach these expectations. As a result, there has been a flood of foreign investors, all looking to make a valuable yen [14].

In an analysis carried out in 2005, nine countries in sub-saharan Africa that include Zambia and Uganda were cited as most likely to meet their MDGs [10], which can be attributed to their awareness and practice of strategic communication in the sustainability game.

But it would be foolish to talk about strategy, sustainability and development without discussing innovation. During the planning phase, governments will set targets, and identify key strategies to achieve the same. As time progresses, it is not unnatural that the path towards a specific goal has shifted off course. It takes innovativeness to realign resources, and refocus priorities [11]. In some cases, governments revisit the drawing board and start afresh.

Closely linked to this is the aspect of time. As a point of interest, time is the only factor that is not subject to change, since there abounds plenty of it. Yet in relation to achievement of goals, time is in fact limited, and has to be mapped out [12]. Policy implementers and consultants are always running out of it, and asking for more. Ironically, as much as there will always be plenty of time for all the seven billion people in the world, in the grand scheme of things, it will always be borrowed.

Consider these revelations concerning time and goal setting;

\[ f([y, t] \cdot [n, t]) \]

\[ (x, y) = f(x, y) \]

VI. SOLUTION

Although Africa continues to struggle with the setbacks of...
slow growth, it is on a linear forward path. Thus the results must yield a positive trend even though this will take a significantly longer time, compared to her oriental counterparts i.e. Asia.

From a social aspect, at times what works best is knowing your strength and embracing it, finding your weakness and destroying it. South Africa is a classic example of a country that has swayed this to their advantage, tapping into their cultural diversity [16] and endowed mineral wealth.

The mathematical representation for our solution can be written as:

\[ s \times c = e \times d \]
\[ f(x, y)^* x = f(y, t)^* (n, t) \]  
(7)

Where \( x \) is the communication factor, \( y \) the goal, \( n \) the innovation and \( t \) represents time (2). Because sustainability is designed to be a continuous process, the equation can be corrected by powering the function to infinity:

\[ \left( f(x, y)^* x = (f(y, t)^* (n, t))^{\infty} \right) \]  
(8)

The supposition for this is that with sustainable development, everything is cyclical [18].

VII. CONCLUSION

Sustainable development is a dicey balance, and even all the math in the world cannot comprehensively explain it. Instead, the latter affords it more clarity as it places emphasis on the factors that matter. Strategic Communication on the other hand, is not simply an art, it is meticulous and should be consistent, otherwise the risk of hitting below set targets will increase with a decline in its implementation.

Faced with this knowledge, sub-Saharan countries should redesign their strategies to reflect capacity, and more importantly political will. There is nothing more disheartening than assembling the best experts in the world only to divert allocated resources to non-governmental projects [19].

APPENDIX

In as much as the suggested mathematical formula remains subject to debate, it is imperative to note in this case that strategy begets sustainability and, strategic communication can be considered a subset of sustainable development:

\[ sc \leq ed \]  
(9)

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REFERENCES