Strategic Human Resource Management of Government Defense R&D Organizations

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Abstract. Sustainable growth is an important concept in strategic management. Sustainable growth rate is a metric commonly used in private sector to determine whether a firm has a sustainable growth or not. Because the main goal of private firms is to make money, sustainable growth rate is calculated using financial measures in the current strategic management literature. However making a profit is not among the main goals of government and non-profit research organizations. Therefore, to benefit from this important concept in strategic management of government defense R&D organizations, we reformulate the sustainable growth rate measurement to account for one of the most important capital of government defense R&D organizations. This important capital is R&D experience. With the help of sustainable growth rate, R&D managers are able to investigate future human resource scenarios of the organization and strategically manage the project workload and the R&D efforts.

1. Introduction

Government research and development (R&D) organizations (GRDO) play an important role in national innovation systems [1]. One of the latest reports from National Science Foundation indicates that a significant portion of R&D conducted in USA is the work of government R&D organizations. Federal government conducts 11.6% of total national R&D and 29.6% of total R&D is funded by the federal government [2]. Government R&D organizations have a strategic role in national R&D and they have to be managed strategically. Most of the strategic management literature focuses on issues related to private organizations. Therefore, strategic management theories and concepts in the current literature have a private sector focus. To make a profit is the main motive for private R&D firms. However, public research institutions including government R&D organizations have different primary motives [5]. They have a different and complementary role in the national innovation systems. Consequently, investigation into the behavior of such organizations require a different perspective than the current strategic management perspective, mostly focusing on private sector. For example, an important concept such as sustainable growth is quite relevant and useful to any kind of organization. Currently, sustainable growth is formulated using financial concepts and terms [3]. With the current definition and formulation, sustainable growth rate (SGR) cannot be used for government R&D organizations. So, in this study, we redefine and reformulate SGR. As a result, GRDOs are now able to benefit from this important concept in strategic human resource management.

We experience that the sustainable growth rate metric can be quite informative and useful in strategic planning or budget meetings. The budgets of government R&D organizations are generally determined by higher authorities that are outside stakeholders. SGR will help to justify early or immediate hiring of R&D staff for future projects.

In our previous studies [4], we conducted many interviews and case studies with project managers regarding project management metrics. We found out that if the managers do not easily and clearly understand how the metric is derived, they are unlikely to use it [4]. Therefore, rather than developing metrics with complex formulations derived from complex theories, development of simple and easy to use metrics should be preferred. In many cases, having approximate results with explanatory power is preferred over having precise results as a result of complex and costly measurements [4]. The measurements should be simple, inexpensive, and effortless. The developed metrics should be simple in nature, easily applicable, and easy to understand. In the development sustainable growth rate metric, we abide by these principles. As a result, SGR is formulated in such a way that it is easy to understand, measure, and use.

2. Sustainable Growth Rate Metric

Many practitioners working in R&D, especially the ones working in government defense R&D institutions, will recognize the importance of domain and field experience. Having experienced researchers and engineers is essential in creating and sustaining a successful R&D organization. Consequently, R&D experience lies in the heart of sustainable growth rate (SGR) metric. In SGR calculation, our focus is measuring R&D personnel experience and workload and how well we maintain a certain level of experience with respect to workload in the organization. To calculate SGR for government R&D organizations, we use some of the well-known metrics. Let's briefly explain these metrics.

R&D Experience of an R&D Worker

An R&D worker is an employee who directly takes part in R&D related work. This worker may be a scientist, a research engineer, or a research technician. R&D experience is measured in terms of months or years depending on the granularity of the measurement.

Total R&D Experience of the Department/Organization

To calculate the total R&D experience, we sum the R&D experience of all R&D workers in the department or in the organization.

Average R&D Experience of the Department/Organization

The average is calculated by dividing the total R&D experience by the number of R&D staff. This metric is quite useful in presenting how experienced the organization is. Clearly, high figures are desired.

Future Total/Average R&D Experience

Naturally, organizations maintain an employment database, which is especially important for government defense R&D organizations. In most cases, development of defense systems must be conducted in secure environments [7,9]. Therefore, the employment databases include employee records with security clearances and background checks due to the classified nature of the projects. Using these databases, it is possible to extract personnel turn-over rate of the organization. This turn-over rate can be used to develop an expected yearly R&D experience change rate. If the organization has a research agenda that includes long-term plans for the projects to be undertaken, an analysis of these plans will reveal the personnel requirements for the future projects. Using the data derived from the analyses of the employment database records and the personnel requirements of the prospective projects, we can build computer simulations to predict the future state of the R&D personnel in our organization.

Future total R&D experience is an estimation of the R&D staff experience of the organization for a future date. It is calculated with the following formula:

$$Future\ R\&D\ Experience = Current\ R\&D\ Experience \times (1 + Expected\ Yearly\ R\&D\ Experience\ Change)^{Number\ of\ Years}$$

$$FE = CE \times (1 + EYEC)^{NY}$$

In the formula, FE is the future R&D experience and CE is the current R&D experience. Expected yearly R&D experience change (EYEC) is the expected percent of change in the experience. It may be a positive or a negative number and it is calculated from statistics based on historical data. NY, number of years, is the difference between the date of calculation and the specified future date.

Future average R&D experience can be calculated similarly.

R&D Experience Change Rate of the Department/Organization

This metric is a combination of total and average R&D experience change rate for the department or the organization. Note that the total experience also accounts for the number of engineers. Therefore, the number of engineers is inherently included in the measurements. Each metric has a coefficient. The total of the coefficients is 1. These coefficients are determined based on the evaluation of the needed workforce. If the projects are complex and require highly experienced staff, then the coefficient of the average R&D experience ($Coefficient_a$) should be high. If the projects require manpower rather than experience, then the coefficient of the total R&D experience ($Coefficient_t$) should be higher. We currently set these coefficients to 0.5.

$$R\&D\ Experience\ Change\ Rate = Coefficient_t \times \frac{Future\ Total\ R\&D\ Experience}{Current\ Total\ R\&D\ Experience} + Coefficient_a \times \frac{Future\ Average\ R\&D\ Experience}{Current\ Average\ R\&D\ Experience}$$

Current Workload

Generally, government R&D institutions conduct business by responding to project requests from other agencies. If both parties negotiate on a project contract, then the government R&D organization issue a project charter. For accounting and auditing purposes, this project charter with a unique ID is linked to a government account. Then all the R&D work done related to the project is tracked using this account. Today, many government R&D organizations use automated systems to keep track of project effort. Even, use of certain automated systems is enforced by government auditing regulations. Consequently, the R&D effort for each project can be automatically measured by such automated accounting systems. In addition to the R&D project related activities, some government R&D organizations also tasked with activities such as certification, national standards development, providing consultancy to other agencies, and investigation of accidents and mishaps etc. These activities may be treated as a project and they can be tracked with automated effort tracking systems.

The current workload or project load may be derived from the project contracts in place. The project effort is expressed in terms of man-month. In SGR calculation, the current number of projects or the effort remaining for the projects are used to express the workload. Since the number of projects is a quite rough metric, we prefer to use effort remaining for the current projects in the SGR calculation.

Future Workload

Governments develop R&D agendas based on their national priorities. These agendas include long-term plans or responsibilities for certain government agencies and organizations. Naturally, government R&D institutions are a part of these agendas based on their strategic expertise areas. Defense R&D institutions have long-term plans since defense projects take years. Hence, these long-term plans help us in predicting the future workload for government R&D organizations especially for the ones in defense. It is possible to estimate the future workload based on statistics derived from project measurements database.

The future workload is estimated for a specific future date. This future date may be a year, 5 years, or 10 years later. The following formula is used to estimate the future workload:

$$Future\ Workload = Current\ Workload \times (1 + Expected\ Yearly\ Workload\ Change)^{Number\ of\ Years}$$

$$FW = CW \times (1 + EYWC)^{NY}$$

In the formula, FW and CW denote the future and current workload respectively. EYWC, expected yearly workload change, is the expected percent of change in the workload. This change rate may be derived from statistics based on historical project data. NY, number of years, is the difference between the date of calculation and the specified future date.

Workload Change Rate of the Department/Organization

This metric is the workload change rate of the organization between the date of calculation and the specified future date. The workload change rate is calculated with the following formula:

$$Workload\ Change\ Rate = \frac{Future\ Workload}{CurrentWorkload}$$

Sustainable Growth Rate (SGR)

The sustainable growth rate (SGR) is calculated by dividing the R&D experience change rate by the workload change rate. These rates are calculated for a specific time period. This period is determined by the scope of the strategic analysis:

$$Sustainable\ Growth\ Rate = \frac{R\&D\ Experience\ Change\ Rate}{Workload\ Change\ Rate}$$

Ideally, our goal is increasing the experience of the organization more than the workload. A higher SGR means that the organization has more experienced R&D staff dealing with the same amount of work. Here, we have a basic assumption that the current workload is satisfactorily handled with the current R&D staff. It is possible to relax this assumption by calculating an adjustment rate for the difference between the current and the required manpower. If the SGR is higher than 1, then we conclude that the organization has a sustainable growth and the organizational R&D experience increase is higher than the workload increase. If the SGR is equal to 1, then we have an optimal growth since our R&D experience and workload is growing at the same rate. Finally, if the SGR is lower than 1, we have an unsustainable growth. The reason we still use the term growth is that based on the strategic management literature the organization is actually growing in terms of workload or number of projects. However, the growth is unhealthy because we will have less experienced staff per work package compared to the earlier states of the organization. We emphasize that R&D work is inherently complex and requires experienced knowledge workers. If the workload increase is faster than the experience increase, the staff will be overwhelmed and they will not be able to complete the projects with the required outcome or the necessary quality. Table 2 lists the interpretations of the SGRs.

Metric	Definition	Unit
R&D Experience of an R&D Worker	Time spent on R&D work by an R&D worker	Months or Years
Total R&D Experience of the Organization/Department	The total experience of R&D staff in the organization/department	Months or Years
Average R&D Experience of the Organization/Department	The average experience of R&D staff in the organization/department	Months or Years
R&D Experience Change Rate	The rate of R&D experience change within the specified time	Without Unit
Current Workload	The project workload of the organization/department in terms of number of projects or remaining work for the contracted projects	Man-month
Future Workload	The estimated workload at a specific future date	Man-month
Workload Change Rate	The rate of workload change within the specified time	Without Unit

Table 1: Metrics used in the Calculation of Sustainable Growth Rate (SGR)

Sustainable Growth Rate (SGR)	Interpretation
Sustainable Growth Rate (SGR) > 1	Growth is sustainable.
Sustainable Growth Rate (SGR) = 1	Growth is optimal.
Sustainable Growth Rate (SGR) < 1	Growth is unsustainable.

Table 2: Interpretation of Sustainable Growth Rate (SGR)

3. Case Study

To explain the use of SGR, we developed a case study using a fictional organization. There are two reasons for not using a real organization. First, some of the data needed for the SGR calculation may be considered sensitive in many organizations. Second, we want to provide a striking example to better illustrate the use of SGR metric. The name of the organization is "Unmanned Aerial Vehicles Research Institute". This institute has 4 research departments and each department employs various number of engineers. Figure 1 shows the organizational structure and the number of engineers in the departments.

The R&D experience of systems engineering research department engineers is shown in Table 3.

We focus on only one of the departments to keep the case study simple. Let's develop a future scenario of personnel turn-over for the systems engineering research department. To make the case interesting and challenging, we assume the following conditions:

1. We start to lose some of our experienced engineers due to retirement or moving to a high-paying private sector job.
2. It is hard to attract experienced research engineers and therefore we could only hire recent graduates or inexperienced young researchers.
3. Our executive managers recognize the increasing workload and they hire additional engineers to increase the departmental capacity over the years.

Note that these conditions are for the sake of this particular case study. Different organizations have different conditions. Based on the conditions, managers may develop various future scenarios. Calculating sustainable growth rate using these scenarios help managers to shape the strategic human resource policies of the organization.

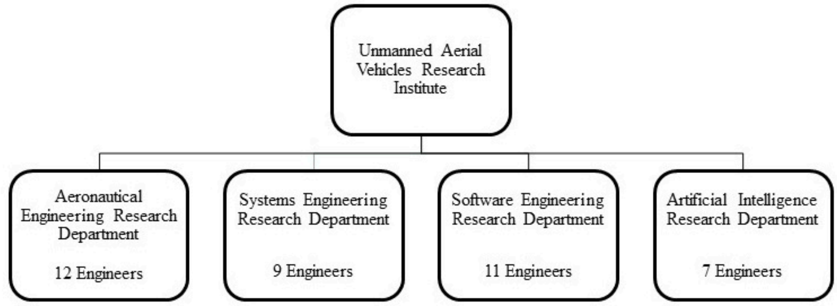


Figure 1: Research Departments of Unmanned Aerial Vehicles Research Institute

Table 4 presents a simulation of personnel turnover for the next decade for the systems engineering research department. The R&D experience of each engineer is listed in the corresponding row. When an engineer leaves, we fill the position by hiring a new engineer. Highlighted cells indicate the hiring of a new engineer. For example, systems engineer 1 has 26 years of R&D experience in 2015. This engineer retires at the end of 2015. We hire a new engineer with no experience in 2016. In Table 5, we show the estimated future workload derived from the long-term plans in the research agenda of the institute. As previously listed under assumed conditions, the executive managers recognize the increase in the project workload and they hire young energetic engineers when a new project starts. Table 4 also shows that the number of engineers is doubled over a ten-year period as the number of projects increases.

We developed the case study in such a striking way that it presents how the use of SGR brings out a dangerous trend for the organization. The workload and the number of engineers is doubled over a decade. By just looking at these numbers, most executive managers would assume that the department will be in good shape since as the number of projects increases, the number of engineers increases accordingly. However, let's investigate how the R&D experience changes over the same period. Figures 2 and 3 show the total and average R&D experience and workload change for the systems engineering department between 2015 and 2025. In this period, even though the number of engineers is doubled, the total R&D experience stays almost the same, and the average experience decreases dramatically. In addition, while the workload is increasing, the average R&D experience is decreasing. This means that the department will have inexperienced staff to deal with an increasing amount of work. This is clearly a danger sign for the organization. Adding inexperienced staff to a project has short-term side effects. They need to be trained and this training is generally conducted by the experienced staff. While the number of research engineers in employment is an important metric, it is insufficient to explain a key aspect of the R&D organizations, which is the accumulation of expertise and research project experience. In essence, if organizational strategists only focus on the number of engineers, they are likely to miss this important aspect. Use of sustainable growth rate metric helps us to investigate trends for this important aspect.

Unmanned Aerial Vehicles Research Institute Systems Engineering Research Department	
R&D Engineer	**As of 2015 R&D Experience (Years)**
Systems Engineer 1	26
Systems Engineer 2	22
Systems Engineer 3	20
Systems Engineer 4	18
Systems Engineer 5	11
Systems Engineer 6	6
Systems Engineer 7	4
Systems Engineer 8	4
Systems Engineer 9	1
Total R&D Experience for Systems Eng. Research Dept. (Years)	**112**
Average R&D Experience for Systems Eng. Research Dept. (Years)	**12,4**

Table 3: R&D Experience of Research Engineers in the Systems Engineering Research Department (in Years)

In Calculation 1 we calculate the sustainable growth rate for the systems engineering research department. We use the simulated data from Table 4. Alternatively, we could derive the necessary measures from historical data. SGR calculation for 2020 is presented.

SGR for the period between 2015-2020

$$R\&D\ Experience\ Change\ Rate = Coefficient_t \times \frac{Future\ Total\ R\&D\ Experience}{Current\ Total\ R\&D\ Experience} + Coefficient_a \times \frac{Future\ Average\ R\&D\ Experience}{Current\ Average\ R\&D\ Experience}$$

$$R\&D\ Experience\ Change\ Rate = 0.5 \times \frac{86}{112} + 0.5 \times \frac{6.1}{12.4} = 0.63$$

$$Workload\ Change\ Rate = \frac{Future\ Workload}{Current\ Workload}$$

$$Workload\ Change\ Rate = \frac{162}{108} = 1.5$$

$$Sustainable\ Growth\ Rate = \frac{R\&D\ Experience\ Change\ Rate}{Workload\ Change\ Rate} = \frac{0.63}{1.5} = 0.42$$

$$SGR_{2020} = 0.42$$

Calculation 1: SGR for the period between 2015-2020

For the period between 2015 and 2020, the SGR is 0.42. The sustainable growth rates for the systems engineering research department up to 2025 are presented in Figure 4. As the figure shows, SGR is in a downward trend indicating a human resources problem for the future. Even though the research department is growing in terms of projects, this growth is unsustainable. It is probable that these projects suffer from quality and other problems because these projects will be carried out by inexperienced R&D staff.

Systems Engineering Research Department	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Systems Engineer 1	26	0	1	2	3	4	5	6	7	8	9
Systems Engineer 2	22	23	24	25	0	1	2	3	4	5	6
Systems Engineer 3	20	21	22	23	24	25	1	2	3	4	5
Systems Engineer 4	18	19	20	2	3	4	5	6	7	8	9
Systems Engineer 5	11	12	13	14	15	3	4	5	6	7	8
Systems Engineer 6	6	7	8	10	11	12	13	14	15	16	17
Systems Engineer 7	4	5	6	7	8	9	10	11	12	13	0
Systems Engineer 8	4	5	6	7	8	9	10	0	1	2	3
Systems Engineer 9	1	2	3	4	5	6	7	8	9	10	11
Systems Engineer 10			0	1	2	3	4	5	6	7	8
Systems Engineer 11			2	3	4	5	6	7	0	1	2
Systems Engineer 12					0	1	2	3	4	5	6
Systems Engineer 13						4	5	6	7	8	9
Systems Engineer 14						0	1	2	3	4	5
Systems Engineer 15								1	2	3	4
Systems Engineer 16								2	3	4	5
Systems Engineer 17										1	2
Systems Engineer 18										0	1
Total R&D Experience for Systems Eng. Research Dept. (Years)	**112**	**94**	**105**	**98**	**83**	**86**	**75**	**81**	**89**	**106**	**110**
Average R&D Experience for Systems Eng. Research Dept. (Years)	**12,4**	**10,4**	**9,5**	**8,9**	**6,9**	**6,1**	**5,4**	**5,1**	**5,6**	**5,9**	**6,1**

Table 4. A Sample Future Scenario of the Systems Engineering Research Department Staff Development – R&D Experience Change of Each Engineer over the Years (Highlighted cells indicate a replacement or an addition of a new engineer)

Systems Engineering Resarch Department	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Number of Projects	4	4	5	5	5	6	6	7	7	8	8
Workload (Man-Month)	108	108	135	135	135	162	162	189	189	216	216

Table 5: Systems Engineering Research Department Project Workload Plan for the Next Decade

4. Discussion

Soft concepts such as project success, management effectiveness, or software quality are hard to measure and validate. In many cases, project managers prefer easy to apply, low cost, and approximate measurements rather than hard to use, costly, and precise metrics. Therefore, rather than having costly and precise measurements, approximate metrics, simply providing an indication of what is happening, are sometimes preferable. One of the most successful project management metric suites is Earned Value Management (EVM) metrics. In essence, the application of EVM gives the program managers a number that is either greater than 1, equal to 1, or smaller than 1. EVM provides an indication of how well the project is doing in terms of cost and schedule performance. Even though, there are many sources for error in the calculation of EVM metrics due to imprecise project planning and estimation, EVM is still a valuable tool and concept. This study is inspired from EVM. It is developed similar to EVM on purpose, so that the R&D department and program managers will quickly recognize the similarity and it is easily adopted. Note the similarity between SPI (schedule performance index), CPI (cost performance index) and SGR. All of them provide a number that is either greater than 1, equal to 1, or smaller than 1. As a result, for the SGR calculation, having an indication of the future status is more important than having a precise sustainable growth rate.

For a government defense R&D organization, there will be an R&D program portfolio mostly guided by governing authorities. Most organizations have certain core competencies and they will try to maintain these competencies to have a competitive advantage. Trying to be an expert at some areas will be a smart strategic choice. Therefore, one of the assumptions regarding this study is that the future projects in these organizations will be similar to the current ones to maintain expertise areas defined in the mission statements. Most projects government defense R&D organizations deal with will be long-term projects evolving over time. Consequently, strategic long term planning of human resources is essential to be successful in these projects.

The sustainable growth rate metric may be applied at different levels or for specific areas. For example, the sample case provided focused on only one department. Therefore, SGR metric is applied at the departmental level. In addition, SGR metric may easily be applied at the organizational, research unit, or program level. The metric may also be applied for a specific R&D research area. For strategic planning purposes, managers may need to predict the future human resource status of the organization for a strategic research area. For example, it is possible to calculate SGR for a domain specific language design for unmanned vehicle autonomous control software research area. Hence, the sustainable growth rate calculation is actually a generic framework that can be customized based on the needs of the strategic planners. The R&D managers can build a strategic portfolio for specific research areas calculating sustainable growth rate for each area in the portfolio. In this aspect, SGR becomes an essential tool for strategic R&D planning.

Another discussion point may be that the productivity of one talented researcher with some years of experience may be higher than another researcher with the same amount of experience. Some researchers will be more talented and productive than others. However, for all organizations, there will be an average talent across the organization. This average talent will not change dramatically in a short time frame, unless extraordinary staff changes occur. SGR is calculated on an organizational hierarchy level, not on the individual level. Therefore, SGR calculations assume that there will be an average talent and it is unlikely that this average will change dramatically in a couple of years for R&D organizations.

Another argument may be that years of experience do not necessarily translate into value. The researchers may just be marking time and not developing. We believe this would be hardly the case, since R&D managers are not supposed to sit idle when employees are not producing any value. Normally, the managers should be taking necessary precautions to prevent such cases and they should find ways to get the most out of their researchers. It is unlikely that the governing bodies will fund the projects of such underperforming organizations that produce little or no value.

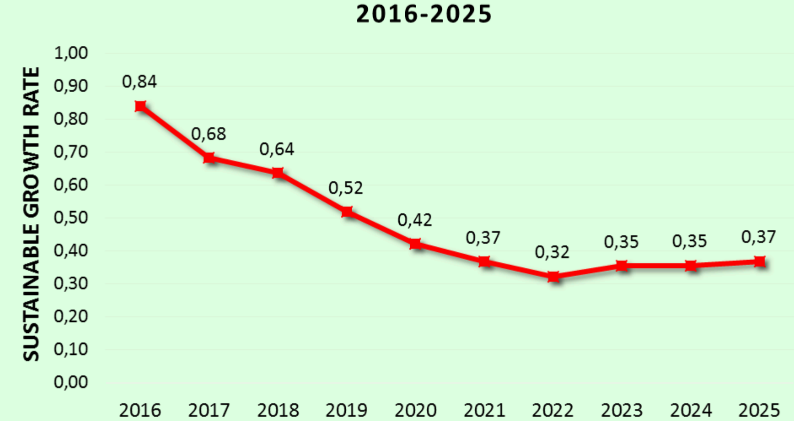
5. Conclusion

Managing human resources is difficult for government R&D organizations due to many reasons including government regulations and security considerations. In addition to acquiring necessary clearances, hiring, staffing, and letting go of employees are bound by strict regulations. A previous survey study [8] confirms that in project management of software intensive systems development, staffing and hiring is more challenging in government organizations than it is in commercial organizations. As a result, a strategic management view and long term planning of human resources are essential in achieving a sustainable organizational growth. Metrics such as sustainable growth rate helps R&D managers in realization of a healthy organizational growth. As a strategic element in national innovation systems, government R&D organizations require good strategic management. With the development of a metric such as sustainable growth rate for government R&D organizations, we contribute to the current body of strategic management literature apart from the main stream. Note that while measuring SGR helps to examine an important aspect of organizational growth, it should not be the only measurement. We clearly need development of other metrics to investigate an important and abstract concept such as sustainable growth. We view the development of SGR based on human capital as a first step in this line of studies. As a measurement tool, SGR helps the executive managers to

Figure 2. Total R&D Experience and Project Workload for Systems Engineering Research Department 2015-2025

Figure 3. Average R&D Experience and Project Workload for Systems Engineering Research Department 2015-2025

Figure 4. Sustainable Growth Rate (SGR) for Systems Engineering Research Department 2016-2025



strategically manage the R&D human resources, the most important capital of the organization.

Certain issues affect the productivity and research output. For example, adaptation of efficient processes increases productivity or increasing the paperwork may lower productivity. One possible extension to SGR metric may be the addition of adjustment factors to account for productivity differences resulted from increases or decreases in process efficiency.

As a conclusion, using SGR metric, it is possible:

- To investigate the future scenarios related to R&D experience changes for a department/organization/program/research area.
- To take actions such as hiring staff early enough for the time needed to transfer critical knowledge from experienced researchers before they leave.
- To communicate the likely future human resource status of the organization/department/program to outside stakeholders.
- To convince the governing stakeholders to fund the acquisition of human resources early enough so that the program/project does not become endangered due to loss of critical/experienced staff.

Essentially, SGR metric may be used for various purposes during strategic human resource planning for organizations with a strategic research portfolio consisting of long term projects. This study may be considered a framework for the application of sustainable growth concept to government defense R&D organizations. It is possible to extend and modify SGR metric for the specific purposes of managers.

6. Disclaimer and Acknowledgements

The views and conclusions contained herein are those of the author and should not be interpreted as necessarily representing the official policies or endorsements, either expressed or implied, of any affiliated organization or government. Preliminary findings of this research was presented in the 4th International Conference on Leadership, Technology, Innovation, and Business Management (ICLTIM 2014), November 20-22, Istanbul, Turkey, 2014 [5] and subsequently included in [6].

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Dr. Kadir Alpaslan Demir graduated from Turkish Naval Academy with a B.S. in Computer Engineering in 1999. After graduation, he worked as a Naval Officer in Navy Submarines. In 2003, he started his graduate education in Naval Postgraduate School, Monterey, CA, USA. Between 2003 and 2005, he completed one M.S. in Computer Science with a focus in Computer Forensics and another M.S. in Software Engineering. Between 2005 and 2008, Dr. Demir completed his doctoral study with the research titled “Measurement of Software Project Management Effectiveness” and was awarded a Ph.D. degree in Software Engineering. He took a post as a faculty member in Department of Computer Engineering in Turkish Naval Academy. Dr. Demir taught undergraduate and graduate courses including software engineering, systems engineering for C4I, project management, research methods in science and engineering, and computer security. Since 2011, he has worked at Turkish Naval Research Center Command. Dr. Demir worked as a software developer and development team leader. Currently, he works as a program manager/assistant program manager in various mission-critical defense projects. He developed the organizational systems engineering processes and frequently participates in process improvement efforts. His research interests include software project management, project management measurement and metrics development, process improvement, change management, R&D and innovation management, systems and software modeling, formal methods, UAV systems simulation. Dr. Demir is currently pursuing a Master’s in Business Administration with a focus in strategic management of technology, innovation, and human resources.

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Notes: *I appreciate your feedback regarding your experiences on the use of sustainable growth rate metric if you choose to apply it in your organization. Please send an e-mail to kadiralpaslandemir@gmail.com.*

REFERENCES

1. OECD, Public Research Institutions: Mapping Sector Trends. OECD Publishing, 2011. http://dx.doi.org/10.1787/9789264119505-en
2. National Science Board, Science and Engineering Indicators 2014. Arlington VA: National Science Foundation (NSB 14-01) 2014.
3. Higgins, Robert C, “How much growth can a firm afford?” Financial management 1977: 7-16.
4. Demir, Kadir Alpaslan. Measurement of software project management effectiveness. PhD Dissertation, Naval Postgraduate School, Monterey, CA, December 2008.
5. Demir, Kadir Alpaslan, and Tolga, Ihsan Burak. A Sustainable Growth Rate Metric Based on R&D Experience for Government R&D Organizations. 4th International Conference on Leadership, Technology, Innovation, and Business Management (ICLTIM 2014), November 20-22, Istanbul, Turkey, 2014.
6. Demir, Kadir Alpaslan, and Tolga, Ihsan Burak. “A Sustainable Growth Rate Metric Based on R&D Experience for Government R&D Organizations” Journal of Global Strategic Management, 16, 2014: 26-36.
7. Demir, Kadir Alpaslan. “Challenges of weapon systems software development.” Journal of Naval Science and Engineering 5.3 (2009).
8. Demir, Kadir Alpaslan. A Survey on Challenges of Software Project Management. Proc. of the Software Engineering Research and Practice, pp. 579-585, Las Vegas, USA, 2009.
9. Demir, Kadir Alpaslan. Analysis of TLCharts for Weapon Systems Software Development. Master’s Thesis, Naval Postgraduate School, Monterey, CA, December 2005.