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Board Report

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Supervisor: Howard Davies

Capital Investment Appraisal for SSGB Stress Team IT System Upgrade

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Student: Sudhir Mahadikar

Email: 2116874@student.uwtsd.ac.uk



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Project Overview

Need of the day

Simulation and analysis of aircraft structures is at the heart of the engineering team as it helps:

- Reduce design cycle time by non-destructive method of simulation of structural behaviour under load.
- Reduce risk of certification test failure and keeps re-testing to a minimum.
- Achieve weight and cost optimised design with minimum number of design iterations.

Current suite of simulation softwares in use are at least a decade old and is significantly less efficient compared to the latest offerings in the market which are much faster, use High Performance Computing (HPC), analysis in Clusters and support Cloud computing to name a few.

In view of the advancements in high performance and cloud computing, company is considering investing in a new computationally more advanced and efficient suite of software package to enhance engineering efficiency, reduce design cycle time and hence reduce engineering overhead.

Options we got

Engineering and IT department together have conducted a market survey of all the available software packages and shortlisted the 2 most relevant software packages (code named for the purpose of study as '**Project Altair**' and '**Project Apex**') for the type of work they carry out. The intent of this study is to carryout financial appraisal of '**Project Altair**' and '**Project Apex**' to select the more suitable of the two projects for capital investment and implementation.

How do we go about it?

This report presents a comparative analysis of two projects identified within the Engineering Stress team of Safran Seats GB (SSGB) to improve process efficiency.

This report will present calculations and results of some of the capital investment appraisal techniques to compare the relative future success of each of these projects. This is intended to give guidance to the Head of Stress and Simulation in making decisions in investing on long-term funds.

Appraisal Techniques and Rational

"Given the importance of investment decisions, it is essential that proper screening of investment proposals takes place. An important part of this screening process is to employ appropriate methods of evaluation" (Atrill, 2020). Capital Investment Appraisal techniques are employed to evaluate the various investment options to decide on the best and the least risky one to invest on.

Capital appraisal methods can largely be divided into:

- Traditional methods comprised of
 - Payback Period (PBP) and
 - Accounting Rate of Return (ARR) and
- Discounted Cash Flow (DCF) methods comprising of:
 - Net Present Value (NPV)
 - Benefit Cost Ration (BCF) and
 - Internal Rate of Return (IRR).

While applying them to project appraisal, one has to be aware that each of the techniques has advantages and disadvantages (Imegi & Nwokoye, 2015).

Project appraisal tools used for the current study are Payback Periods, Internal Rate of Return (IRR), Net Present Value (NPV), Profitability Index (PI) and the Benefit Cost Ratio (BCR) (UKEssays, 2020).

“A project’s payback period is the length of time before you recover your initial investment” (Brealey et al., 2001). For the purpose of evaluation of project merits an average life span of 5 years is considered for both the projects. Either a major upgrade or a full replacement of the then in use software can be considered at the end of the 5th year tenure. For initial scrutiny of both the projects, a **payback period of not more than 2.5 years** is desirable.

NPV is a technique which seeks to remedy some of the defects of payback by taking into account the time value of money (Weetman, 2013). A Weighted Average Cost of Capital (WACC) of 10% is assumed for Net Present Value (NPV) calculation considering the company and the projects are at medium risk of capital investment losses. **A positive NPV is a must** for a project to be chosen for implementation (McLaney, 2006).

“The profitability index is the present value of cash flows (discounted at the cost of capital) divided by the present value of the investment intended to produce those cash flows” (Weetman, 2013). Profitability Index (PI) is expected to be **greater than 1.0**.

“The benefit-cost ratio (BCR) is an indicator showing the relationship between the relative costs and benefits of a proposed project, expressed in monetary or qualitative terms” (ADAM HAYES, 2022). BCR greater than one indicates the project is expected to yield positive NPV. Project with **larger Benefit Cost Ratio (BCR)** will have preference over the other.

“The internal rate of return (IRR) of an investment is the discount rate that, when applied to its future cash flows, will produce an NPV of precisely zero” (Atrill, 2020). As the intent of the project is to improve the efficiency of the work force by up-skilling and reducing analysis cycle time, an **IRR of at least 20%** is expected from the selected project.

Only one of the two projects can be selected for implementation. Hence, a decision need be made based on the outcome of the appraisal process.

Findings from the capital appraisal

Relative project costs, Cash flow estimates, Project Models and calculation of Key Performance Indicators of investment appraisal are presented in Appendix A.

Findings of investment appraisal are presented in Table 1.

Project Appraisal KPI's	Project Altair	Project Apex	Observation
Payback Period	1.9Yrs	2.5Yrs	Project Altair has the lowest payback period
Net Present Value (NPV)	£310,153	£216,716	Project Altair has higher NPV
Profitability Index (PI)	1.96	1.56	PI for Project Altair is the highest
Benefit Cost Ratio (BCR)	0.96	0.56	Project Altair has higher BCR
Internal Rate of Return (IRR)	43%	30%	IRR is higher for Project Altair

Table 1: KPI's of Capital Project Appraisal and observations

Recommendations

- Both the projects pass all the set criterion of minimum payback period of 2.5 years, have positive Net Present Values, IRR's are >20% as well as Profitability Indices of over 1.0.
- From the KPI's it is clear that 'Project Altair' is estimated to have better financial performance forecast over 'Project Apex' and hence the preferred choice for future investment.
- 'Project Apex' is cheaper on Explicit Non-Linear analysis (Ref Table 3, Appendix A), advantage of Capital rationing could be considered to take advantage of this cost benefit.
- Current appraisal does not compare software security and system robustness of the two softwares suites as well as any human factors involved.
- Technical comparison of the two software suites for their strengths, weakness, opportunities and threats has not been accounted for in this appraisal.

Alternate Funding Options

- Equity or debt financing for capital funding could be considered on a business unit level considering the shorter lifespan of the project.
- Where design and development projects are large with long duration customer engagement is expected, for mutual financial benefit, customers can be encouraged to invest a certain percentage of capital for infrastructure improvement, such as in a new test and simulation facility.
- Where profitable to do so, software vendors can be negotiated with to provide leased software licenses and modules for a fixed period to reduce initial capital investment cost.
- If the cost of capital can be spread over several years, enhancement of allocated Capital Expenses Fund can be explored as an option. This helps spread the cost over a period of time rather than a onetime investment.

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APPENDIX A

Project Costs

Detailed estimates of project costs are presented in Table 1.

- All recurring costs of this project are to be born within the allocated Annual **Capital Expenses** fund for the Stress Department.
- Implementation costs are to be drawn from the Infrastructure Improvement Fund for the SSGB business unit and/or from one or many long term funded customer programmes. A decision on funding to be made based on down selection of the Software suite and ceiling on the Infra Improvement Fund.

All costs in £ Sterlings

Particulars	Project Altair	Project Apex
Implementation/Fixed Costs		
Hardware & Networking	£100,000	£110,000
Software	£200,000	£250,000
Training	£4,000	£0
IT consultancy Charges	£12,500	£15,000
Data Migration	£5,000	£10,000
Sub-Total	£321,500	£385,000
Recurring Costs/Annum		
Annual Maintenance Contract	£20,000	£25,000
HPC / Cloud Charges	£5,000	£4,000
Tech Support	£5,000	£2,000
IT consultancy Charges	£5,000	£5,000
Sub-Total	£35,000	£36,000
Cost of Decommissioning		
IT consultancy Charges	£2,500	£2,500
Hardware Salvage Value	-£10,000	-£12,000
Sub-Total (Salvage/Residual)	-£7,500	-£9,500

Table2: Project Costs

NOTE: All Values based on estimated average team strength of 20 stress engineers at any point in time.

Cash Flows

Cash flow per annum is calculated based on cash savings due to both the savings in machine time and man hours per year in comparison to existing set-up.

Machine time cost, per hour	£10.00					
Man time cost, per hour	£45.00					
Particulars	Man/Machine Hours			Avg. Tasks per annum (20 Enggs.)	Savings per Annum	
	Current Set-up	Project Altair	Project Apex		Project Altair	Project Apex
Bench-mark Linear Static Run time	0.5	0.3	0.25	150	£300	£375
Bench-mark Static Non-Linear Static Run Time	5	3	2.5	60	£1,200	£1,500
Bench-mark Optimisation Run	3	2	2	30	£300	£300
Bench-mark Explicit non linear Run	72	60	50	50	£6,000	£11,000
Bench-mark 2D shell mesh modeling and model setup & debug	16	10	12	120	£32,400	£21,600
Bench-mark 3D solid mesh modeling and model setup & debug	40	30	32	120	£54,000	£43,200
Bench-mark Explicit non linear model setup & debug	80	60	57	70	£63,000	£72,450
Bench-mark Linear Static Analysis Post processing	8	6	6	150	£13,500	£13,500
Bench-mark Non-Linear Static Analysis Post processing	12	8	7	60	£10,800	£13,500
Bench-mark Optimisation Analysis Post processing	12	8	7	30	£5,400	£6,750
Bench-mark Explicit Non-Linear Analysis Post processing	24	18	20	50	£13,500	£9,000
Sum Total of Savings OR Cash Flow Per Annum					£200,400	£193,175

Table 3: Annual Cash Flows

Project Model

Project Altair						
Investment	(321,500)					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Savings		200,400	200,400	200,400	200,400	200,400
Less Recurring Costs		35,000	35,000	35,000	35,000	35,000
Decommissioning Costs/Income						-7,500
Cash Flows	(321,500)	165,400	165,400	165,400	165,400	172,900
Net Benefit	-321,500	-156,100	9,300	174,700	340,100	513,000
Payback Period						
Breakeven point is between 1 and 2 years	-0.94					
<i>Payback Period (manual calc.)</i>	1.9 Years					
WACC	10%					
Denominator	1	1.10	1.21	1.33	1.46	1.61
Future Value	-321,500	150,364	136,694	124,267	112,970	107,357
NPV	310,153	POSITIVE				
Profitability Index (PI)	1.96					
Benefit Cost Ratio (BCR)	0.96					
IRR (Excel Calc)	43%					

Table 4: Project Model and KPIs for 'Project Altair'

Project Apex						
Investment	(385,000)					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Savings		193,175	193,175	193,175	193,175	193,175
Less Recurring Costs		36,000	36,000	36,000	36,000	36,000
Decommissioning Costs/Income						-9,500
Cash Flows	(385,000)	157,175	157,175	157,175	157,175	166,675
Net Benefit	-385,000	-227,825	-70,650	86,525	243,700	410,375
Payback Period						
Breakeven point is between 2 and 3 years	-0.45					
<i>Payback Period (manual calc.)</i>	2.5 Years					
WACC						
	10%					
Denominator	1	1.10	1.21	1.33	1.46	1.61
Future Value	-385,000	142,886	129,897	118,088	107,353	103,492
NPV	216,716	POSITIVE				
Profitability Index (PI)						
	1.56					
Benefit Cost Ratio (BCR)						
	0.56					
IRR (Excel Calc)						
	30%					

Table 5: Project Model and KPIs for 'Project Apex'