

4 Research Analysis

4.1 Correlation of Variables

Independent Variable	Pearson Correlation Annual Revenue	Sig. (2-tailed)
No. of Engineers	.991(**)	.000
Product Maturity Level	.614(**)	.005

Table 11: Correlation of factors consider for revenue model

** Correlation is significant at the 0.01 level (2-tailed)

There is a high degree of correlation between annual revenue of a company with no. of engineers and product maturity level. Both these correlation are significant at 1% significance level. Therefore both of these factors consider for model frame work.

Independent Variable	Pearson Correlation with Revenue Growth	Sig. (2-tailed)
Employee Growth 2006	.786(**)	.000
Service Domain Attractiveness	.916(**)	.000
Technology Capability	.676(**)	.000
Growth strategy focus	.961(**)	.000
Industry growth rate		.(a)
Stake holder risk avoidance	.775(**)	.000

Table 12: Correlation of factors consider for revenue growth model

** Correlation is significant at the 0.01 level (2-tailed).

(a) Cannot be computed because at least one of the variables is constant.

As shown in the above table Employee growth 2006, Service domain attractiveness, Technology capability, Growth strategy focus and Stakeholder risk avoidance factors are having a high degree of correlation with Revenue growth. Therefore all of these factors are considered for the Revenue growth model framework. Correlations of all of these factors are significant at 1 percent. Industry growth is a constant and therefore did not have a correlation with the revenue growth. Therefore this parameter considered initially in the conceptual framework was removed from model framework.

Dependent Variable	Number of years in business	Quality of Engineers	Quality of Management	Management Commitment
Pearson Correlation with Process Maturity	.375(*)	.645(**)	.132	.586(**)
Sig. (2-tailed)	.041	.000	.486	.001

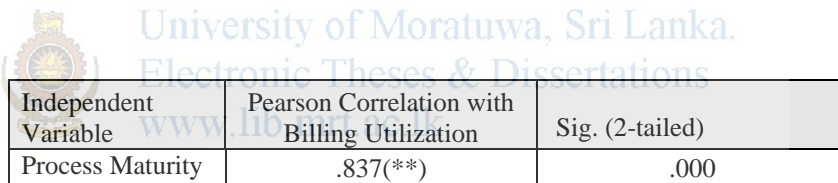
Table 13: Correlation of factors consider for Process maturity model

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Quality of management does not have a strong correlation with process maturity. Therefore this parameter was removed from the original conceptual framework and replaced with management commitment that is having a very strong correlation with process maturity and significant level of 1 percent.

Quality of engineers is highly correlated with process maturity of the company and significant at 1 percent significance level. Number of years in business is also correlated with process maturity and significant at 5 percent level. Therefore all of these factors were consider for the model framework.



Independent Variable	Pearson Correlation with Billing Utilization	Sig. (2-tailed)
Process Maturity	.837(**)	.000

Table 14: Correlation Billing utilization and Process maturity model

** Correlation is significant at the 0.01 level (2-tailed).

There is a very high degree of correlation between Billing utilization and process maturity and significant at 1 percent significance level. Therefore this relationship was considered for the model framework.

Dependent Variable	Billing Utilization	Staff Attrition Rate	Project Risk
Pearson Correlation with Net Profit Margin	.817(**)	-.794(**)	.116*
Sig. (2-tailed)	.000	.000	.054

Table 15: Correlation of factors consider for Profit Margin model

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

There is a very high degree of positive correlation between Billing utilization and the Net Profit margin at 1% significance level. Staff Attrition rate is having a high degree of negative correlation with Profit margin at 1% significance level. There is no high degree

of correlation between Project Risk with Profit Margin. However empirical evidence shows that project risk is affecting future profit margins of the company and is one factor that investors are keen to consider in making investment decisions. Therefore all of these relationships were considered for the model framework.

Independent Variable	Pearson Correlation Net Profit Margin	Sig. (2-tailed)
Process Maturity	.861(**)	.000

Table 16: Correlation Billing utilization and Process maturity model

** Correlation is significant at the 0.01 level (2-tailed).

The process maturity level of a company is having a very high degree of positive correlation with Net Profit margin of the company. This correlation supports the positive correlation between Billing Utilization and the Net profit margin. Therefore this relationship supports the model framework.

Dependent Variable	Annual Revenue	Revenue Growth	Net Profit Margin
Pearson Correlation with Business Value	.993(**)	.164(*)	.383(*)
Sig. (2-tailed)	.000	.038	.037

Table 17: Correlation of factors consider for Business Valuation model

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

There is a very high degree of correlation between Annual Revenue of a company and Business Value and it is significant at 1 percent significance level. Net profit margin and Revenue Growth are correlated with the Business value of a company and are significant at 5 percent significance level. Because of the sensitivity and the difficulty of capturing the absolute values for the revenues of the software companies for year 2005 and 2006 the interval scale was used to capture the revenue data. The middle value of the captured data is been used as the revenue for each of the 2005 and 2006. Because of this approximation the actual revenue growth of the respondent companies differ from the values been used for this research purpose.

4.2 Revised Conceptual Framework

Null Hypotheses	Pearson Correlation	Sig. (2-tailed)	Status of Ho
H1o = There is no relationship between Annual Revenue and Number of Engineers that work for the offshore software development company.	.991(**)	.000	Reject
H2o = There is no relationship between Annual Revenue and Maturity level of products developed by the offshore software development company.	.614(**)	.005	Reject
H3o = There is no relationship between Revenue Growth and attractiveness of Service Domains served by the offshore software development company.	.916(**)	.000	Reject
H4o = There is no relationship between Revenue Growth and attractiveness of Growth Strategy adopted by the offshore software development company.	.961(**)	.000	Reject
H5o = There is no relationship between Revenue Growth and Technology capability of an offshore software development company.	.676(**)	.000	Reject
H6o = There is no relationship between Revenue Growth and Employee Growth rate of an offshore software development company.	.786(**)	.000	Reject
H7o = There is no relationship between Revenue Growth and offshore software development Industry Growth in Sri Lanka.		.(a)	Excluded
H8o = There is no relationship between Revenue Growth and Client risk avoidance.	.775(**)	.000	Reject
H9o = There is no relationship between Process Maturity and Number of years in business operation.	.375(*)	.041	Reject
H10o = There is no relationship between Process Maturity and Quality of Development Staff in an offshore software development company.	.645(**)	.000	Reject
H11o = There is no relationship between Process Maturity and Quality of Management team in an offshore software development company.	.132	.486	Accept
H12o = There is no relationship between Billing Utilization and Process Maturity level of an offshore software development company.	.837(**)	.000	Reject
H13o = There is no relationship between Profit margins and Billing Utilization	.817(**)	.000	Reject
H14o = There is no relationship between Profit margins and Staff Attrition rate	-.794(**)	.000	Reject
H15o = There is no relationship between Profit margins and Project/portfolio risk	.116*	.054	Reject
H16o = There is no relationship between Business Value and Annual Revenue	.993(**)	.000	Reject
H17o = There is no relationship between Business Value and Revenue Growth rate of the company	.164(*)	.038	Reject
H18o = There is no relationship between Business Value and Profit margins of the company	.383(*)	.037	Reject
H19o = There is no relationship between Management Commitment and Process maturity	.586(**)	.001	Reject

Table 18: Status of Null Hypotheses

*Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

(a) Cannot be computed because at least one of the variables is constant

There is no relationship between Quality of management and process maturity. Therefore reject null hypotheses and quality of management was not considered for the revised conceptual framework. It has found that management commitment, a sub parameter of the quality of management is highly correlated with process maturity.

H19o = There is no relationship between Management commitment and Process maturity

H19a = There is a relationship between Management commitment and Process maturity

Therefore accept the null hypotheses.

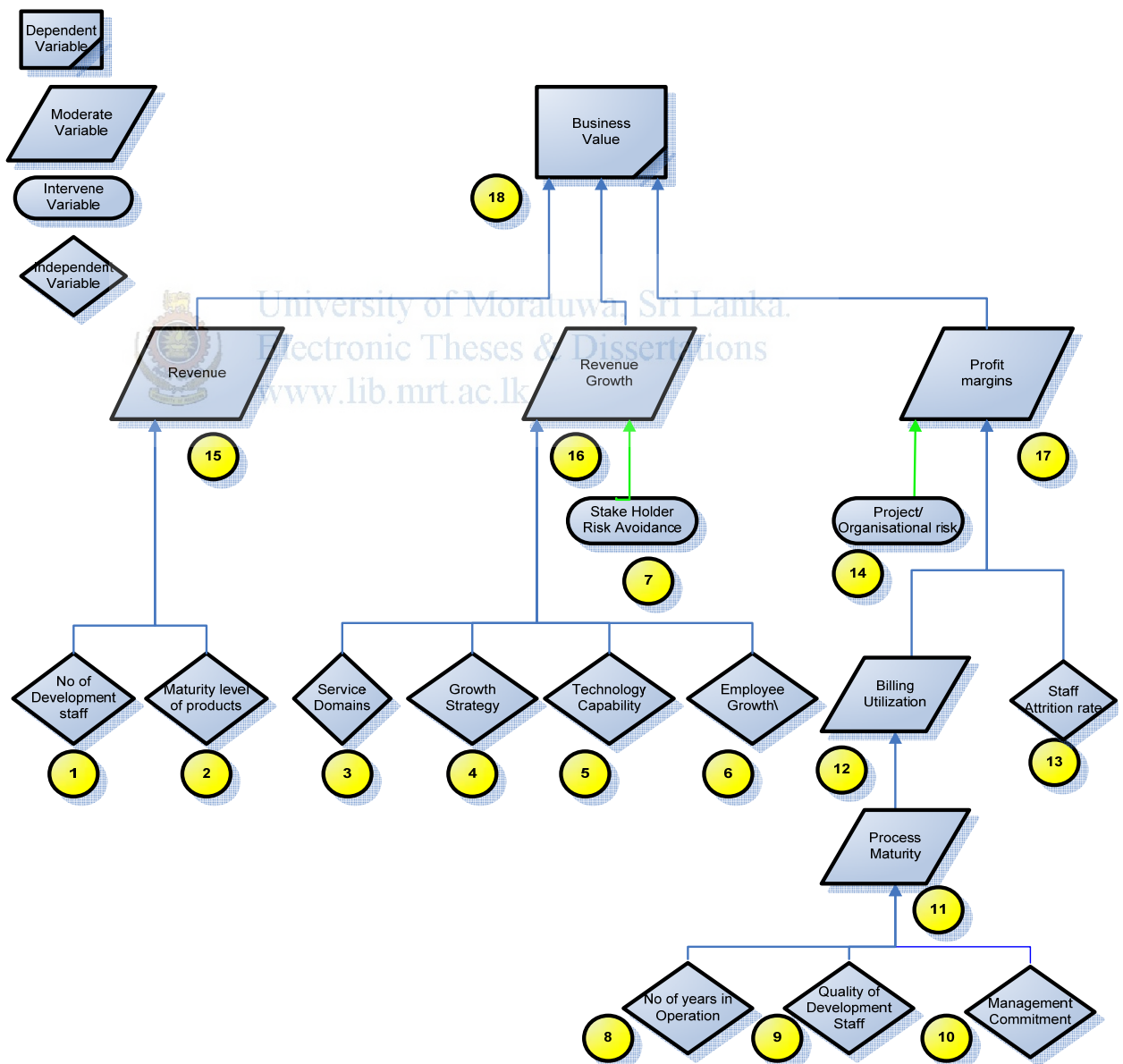


Figure 18: Revised Conceptual Framework

4.3 Modeling

4.3.1 Revenue Model for Offshore Companies (Product and Project)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1.1	0.875	0.765	0.736	0.696630	0.765	26.093	2	16	0.000

Table 19: Revenue Model Summary for Product and Offshore companies
Predictors: (Constant), Product Maturity Level, No. of Engineers

The Revenue model prediction power is 74 percent as shown in the Table 19.

F value indicated in the Model summary table is also significant at 1% level. Therefore, there is a relationship between annual revenue of an offshore software development company with number of software engineers and product maturity of the products.

Model	Variable Name	Un standardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1.1	(Constant)	-1.515	0.909		-1.667	0.115	-3.442	0.412
	No. of Engineers	0.019	0.004	0.711	5.142	0.000	0.011	0.027
	Product Maturity Level	0.247	0.126	0.270	1.955	0.068	-0.021	0.514

Table 20: Coefficients of Revenue Model for Product and Offshore companies

Therefore forecasted model is as follows,

$$Y = -1.515 + 0.019X_1 + 0.247X_2$$

Where,

Y = Annual Revenue

X₁ = Number of Engineers (X₁ > 0)

X₂ = Product Maturity Level (0 < X₂ < 11)

If number of software engineers increases by one engineer, the annual revenue will increase by US \$ 0.19 million. If Product maturity Level increases or decreases by one unit annual revenue will increase by US \$ 0.247 million.

4.3.2 Revenue Model for Offshore Companies (Project)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1.2	0.991	0.982	0.982	0.599467	0.982	1,546.286	1	28	0.000

Table 21: Revenue Model Summary for Offshore companies

The prediction power of the model is 98% as shown in Table 21.

F value indicates in the model summary table is also significant at 1%. F value significance shows that there is a relationship between annual revenue of a software company with number of software engineers.

Model	Variable Name	Un standardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1.2	(Constant)	0.119	0.125		0.954	0.348	-0.136	0.374
	No. of Engineers	0.023	0.001	0.991	39.323	0.000	0.021	0.024

Table 22: Coefficients of Revenue Model for Offshore companies

Therefore forecasted model is as follows,

$$Y=0.119+0.023X_1$$

Where,

Y = Annual Revenue

X₁= No. of Engineers (X₁>0)

If the number of software engineers increases by one engineer annual revenue will increase by US \$ 0.023 million for a offshore software development company.

4.3.3 Revenue Growth Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
2	0.985	0.970	0.964	0.03084	0.970	157.699	5	24	0.000

Table 23: Revenue Growth Model Summary

The model prediction is 96% as shown in Table 23.

F value indicated in the model summary table is also significant at 1%. F value significance shows that there is a relationship between revenue growth with growth rate of software engineers, service domain attractiveness, technology capability, and growth strategy focus and stakeholder risk avoidance.

Model	Variable Name	Un standardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
2	(Constant)	-0.657	0.103		-6.374	0.000	-0.870	-0.445
	Employee Growth	0.070	0.024	0.152	2.955	0.007	0.021	0.119
	Service Domain Attractiveness	0.025	0.007	0.285	3.610	0.001	0.011	0.039
	Technology Capability	0.015	0.008	0.094	1.874	0.073	-0.002	0.032
	Growth strategy Focus	0.017	0.003	0.463	4.940	0.000	0.010	0.024
	Stake holder risk avoidance	0.007	0.004	0.106	1.787	0.087	-0.001	0.015

Table 24: Coefficients of Revenue Growth Model

Therefore forecasted model is as follows,

$$Y = -0.657 + 0.070X_1 + 0.025X_2 + 0.015X_3 + 0.017X_4 + 0.007X_5$$

Where,

Y = Revenue Growth

X₁ = Employee Growth (-0.99 < X₁ < 0 or X₁ > 0)

X₂ = Service Domain Attractiveness (0 < X₂ < 21)

X₃ = Technology Capability (0 < X₃ < 16)

X₄ = Growth strategy Focus (0 < X₄ < 31)

X₅ = Stake holder risk avoidance (0 < X₅ < 11)

If growth rate of software engineers increases by 1%, revenue growth will increase by 0.07%, increases in service domain attractiveness by one unit is accountable to a revenue growth of 0.025, increases in technology capability by one unit is accountable to a revenue growth of 0.015, increases in growth strategy focus by one unit is accountable to a revenue growth of 0.017, increases in Stake holder risk avoidance by one unit is accountable to a revenue growth of 0.007.

4.3.4 Process Maturity Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
3	0.743	0.552	0.500	1.461	0.552	10.683	3	26	0.000

Table 25: Process Maturity Model Summary

The model prediction is 50% as shown in the Table 25.

F value indicated in the model summary table is also significant at 1%. F value significance shows that there is a relationship between process maturity, number of years in business, quality of engineers and management commitment.

Model	Variable Name	Un standardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
3	(Constant)	-0.267	2.741		-0.097	0.023	-5.902	5.368
	Number of years in business	0.132	0.109	0.169	1.203	0.240	-0.093	0.357
	Quality of Engineers	1.352	0.423	0.469	3.192	0.004	0.481	2.222
	Management Commitment	1.151	0.555	0.318	2.075	0.048	0.011	2.292

Table 26: Coefficients of Process Maturity Model

Therefore forecasted model is as follows,

$$Y = -0.267 + 0.132X_1 + 1.352X_2 + 1.151X_3$$

Where,

Y = Process Maturity

X₁ = Number of years in business (2 < X₁)

X₂ = Quality of Engineers (1 < X₂)

X₃ = Management Commitment (0 < X₃ < 6)

If the Number of years in business increases by one, level of process maturity an increases by 0.132 units and increases in quality of engineers by one unit is accountable to increases in level of process maturity by 1.352 units and increase in management commitment by one unit would be accountable to increases in level of process maturity by 1.151 units.

4.3.5 Billing Utilization Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
4	0.837	0.701	0.690	0.02894	0.701	65.606	1	28	0.000

Table 27: Billing Utilization Model Summary

The model prediction power is 69% as shown in Table 27.

F value indicated in the model summary table is also significant at 1%. F value significance shows that there is a relationship between billing utilization and process maturity.

Model	Variable Name	Un standardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
4	(Constant)	0.382	0.037		10.201	0.000	0.305	0.459
	Process Maturity	0.021	0.003	0.837	8.100	0.000	0.016	0.026

Table 28: Coefficients of Billing Utilization Model Summary

Therefore forecasted model is as follows,

$$Y = 0.382 + 0.021X_1$$

Where,

Y = Billing Utilization

X₁ = Process Maturity (0 < X₁ < 21)

If process maturity increases by one unit, billing utilization increases by 0.021%.

4.3.6 Profit Margin Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
5	0.892	0.796	0.773	0.02284	0.796	33.901	3	26	0.000

Table 29: Profit Margin Model Summary

The model prediction power is 77 % as shown in Table 29.

F value indicated in the model summary table is also significant at 1%. F value significance shows that there is a relationship between billing utilization, staff attrition rate and project risk with profit margin.

Model	Variable Name	Un standardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
5	(Constant)	-0.205	0.100		-2.055	0.050	-0.411	0.000
	Billing Utilization	0.551	0.123	0.598	4.490	0.000	0.299	0.803
	Staff Attrition Rate	-0.512	0.155	-0.420	-3.294	0.003	-0.831	-0.192
	Project Risk	-0.008	0.003	-0.218	-2.283	0.031	-0.015	-0.001

Table 30: Coefficients of Profit Margin Model

Therefore forecasted model is as follows,

$$Y = -0.205 + 0.551X_1 - 0.512X_2 - 0.008X_3$$

Where,

Y = Profit Margin

X₁ = Billing Utilization (0.01 < X₁ < 1.0)

X₂ = Staff Attrition Rate (0 < X₂ < 1.0)

X₃ = Project Risk (0 < X₃ < 10)

If billing utilization increases by 1%, profit margin increase by 0.551% and increase in Staff Attrition Rate by 1% is accountable to a decrease in Profit Margin by 0.512% and increase in project risk by one unit accountable to a decrease in profit margin by 0.008%.

4.3.7 Business Value Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.996	0.991	0.990	1.6440189	0.991	971.411	3	26	0.000

Table 31: Business Value Model Summary

The model prediction power is 99% as shown in Table 31.

F value indicated in the model summary table is also significant at 1%. F value significance shows that there is a relationship between annual revenue, revenue growth and profit margin with business value.

Model	Variable Name	Un standardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	-3.598	0.793		-4.539	0.000	-5.227	-1.969
	Annual Revenue	3.624	0.076	0.967	47.787	0.000	3.468	3.780
	Revenue Growth	6.242	1.972	0.062	3.165	0.004	2.188	10.296
	Profit Margin	18.534	7.138	0.054	2.597	0.015	3.862	33.205

Table 32: Coefficients of Business Value Model

Therefore forecasted model is as follows,

$$Y = -3.598 + 3.624X_1 + 6.242X_2 + 18.534X_3$$

Where,

Y = Business Value

X₁ = Annual Revenue (X₁ > 0 million US \$'s)

X₂ = Revenue Growth (-1 < X₂ < 1)

X₃ = Profit Margin (-1 < X₃ < 1)

If annual revenue increases by US \$ 1 million, the business value increases by US \$ 3.624 million, increases in revenue growth by 1% increases the business value by US \$ 0.062 million and increase in profit margin by 1% increases the in business value by US \$ 0.19 million.

4.4 Model summary

Revenue Model for Offshore Companies (Product and Project)
Annual Revenue = $-1.515 + 0.019 (\text{Number of Engineers}) + 0.247(\text{Product Maturity Level})$
Revenue Model for Offshore Companies (Project)
Annual Revenue = $0.119 + 0.023(\text{No. of Engineers})$
Revenue Growth Model
Revenue Growth = $-0.657 + 0.070(\text{Employee Growth}) + 0.025(\text{Service Domain Attractiveness}) + 0.015(\text{Technology Capability}) + 0.017(\text{Growth strategy Focus}) + 0.007(\text{Stake holder risk avoidance})$
Process Maturity Model
Process Maturity = $-0.267 + 0.132(\text{Number of years in business}) + 1.352(\text{Quality of Engineers}) + 1.151(\text{Management Commitment})$
Billing Utilization Model
Billing Utilization = $0.382 + 0.021(\text{Process Maturity})$
Profit Margin Model
Profit Margin = $-0.205 + 0.551(\text{Billing Utilization}) - 0.512(\text{Staff Attrition Rate}) - 0.008(\text{Project Risk})$
Business Value Model
Business Value = $-3.598 + 3.624 (\text{Annual Revenue}) + 6.242 (\text{Revenue Growth}) + 18.534 (\text{Profit Margin})$

Table 33: Summary of models