Question 1:

Describe and explain the benefits, which Whirlpool Corporation expected to gain from the proposed innovation, the introduction of an enterprise resource planning (ERP) system.

Whirlpool considered as the worldwide leader in the home appliance industry had nearly ten years experience selling to the European market and had grown its European market share to a size of 13%.

Enterprise resource planning (ERP) is an industry term for the broad set of activities supported by multi-module application software that help a manufacturer or other business manage the important parts of its business, including product planning, parts purchasing, maintaining inventories, interacting with suppliers, providing customer service, and tracking orders

Enterprise resource planning (ERP) system is strategic business initiative, which standardizes the global business operation by using the best practice processes. ERP link all functions manufacturing, operations and administrative activities and information systems in one unified network. It allows the company to share information, knowledge and data across the organization.

Benefits of the ERP

Whirlpool expected to gain great benefits from implemented an enterprise resource planning (ERP) system. It is expected that ERP system would allow Whirlpool to better serve its consumer market for stand alone appliance and contract market for built in and at the same time reduce its inventory by 12 days of sales. These competing goals would be accomplished through an information system that would allow a country sales office to view product throughout the supply chain, thereby increasing the efficiency of the distribution process. Whirlpool also expected implemented ERP to provide some integration with suppliers and to increase inventory visibility across the supply chain. This would enable Whirlpool to improve product availability and have a substantially lower inventory level. Add to the above that implemented ERP system will allow Whirlpool to build products to the specific orders from contractors. With ERP, Whirlpool Europe's disparate information systems would be retired and replaced with a single computing architecture for all Europe.

Using ERP will create a lot of benefits to the company; following are the benefits that the management believes that they will get by using ERP:

- One of these benefits is that the whirlpool can serve its consumers market for stand-alone appliance better.
- They can contracts market for built-in appliances
- Reduce its inventory by 12 days of sales.
- Increase the efficiency of the distribution process.

- They will be able to forecast a 0.25% gross margin increases by the second year after implementation.

Whirlpool can benefit from applying this system by improving their products availability if they provide some integration with suppliers and to increase inventory visibility across the supply chain then they can get a substantially lower inventory level. Finally the ERP system would allow whirlpool to build products to specific orders from contractors.

One of the benefits from ERP increased efficiency, and improved quality, productivity and profitability. ERP systems are commonly composed of four major parts, covering accounting, and manufacturing, sales and human resource.

The impacts of applying the ERP system on the competition

Whirlpool Corporation started implementing the ERP system in North America, Brazil, and selected central European countries. This new system had reflected on the competition on the Whirlpool itself and on the other companies. Whirlpools become the third company in the European market that makes the competitors follow its way and use the same system especially in Europe.

In conclusion, implementing the ERP system on the Whirlpool Company is a great progress and will create a lot of benefits related to process, quality and customer satisfaction, such as:

1- They would serve their customers better, which attract more customers.
2- The time was spending in transit will reduce, so they can serve their customers faster.
3- The flow of information between the branches in the 12 countries will be smoother and they can present the accurate information to the suppliers, customers, managers and other branches in a very limited time.
4- The company could make some improvements on its products and they could increases the quality and the efficiently of their products.
5- The company could offers the requirements of the customers at the right time, which mean that they would sell all their products if they offered it on the time of orders.

Question 2:

Describe and explain how Whirlpool Corporation expected resources to be absorbed and costs to be incurred through the implementation and maintenance of the new ERP system.

The costs of implementation

I think implementing the ERP System will lead to a tremendous cost to obtain the whole related software. For example, the cost in year 1999 was $ 4.3 million, and in

year 2000 it was $ 8,6 million, and in year 2001 it became $ 6,9 million and in year 2002 it was $4,1 million.

The company also has to pay for the software licenses, they paid $ 6 million in 1999 and they paid $ 3 million in 2000.

Also, the company has to put a great budget to succeed in implementing the enterprise resource planning software. They need to spend to train their employees to be able to use the new software efficiently and profitability. Using this new system needs to create, test and document a new business process. Furthermore, the installation of the enterprise resource planning will cost them a lot of money.

Using this new system will cost them an average of 50 current Whirlpool employees working with as consultants. The company needs 19 consultants in 1999, and needs nine in 2000, and seven in 2001 and four in the 2002. So, this is a capital expenditure for the company, which I will summarize it in the table below:

The number of consultants	The year
19	1999
9	2000
7	2001
4	2002

To complete the implementation of the enterprise resource planning successfully, the management of the company planned to form a task force team consist of three persons in place beginning in July 2000 through June 2004, at an annual cost of $ 600,000.

After implementing the new system in all waves (in the beginning of 2003), the company spent $ 3 million to maintain working efficiently and to manage this system annually. Again in the beginning of 1999 whirlpool thinks that this project will gains $ 0.6 million in annual expense, which increased to $ 0.6 million each following year until 2003, in this year the project reached a steady state.

There are supplementary costs the company has to pay as: license maintenance fees, which costs the company $ 0.1 million at 2000 and that costs increased $ 0.1 million every year until it reaching $ 0.4 million through 2003.

Factors about saving costs and benefits

One of the most important benefits of ERP system is reducing about 18 % of a total of 79 desk employees with an average cost of $ 40,000n per year per employee.

Also it would simplify the accounting function and result in reducing a 15 employees out of 60 finance employees, so the cost saving was $ 45,000 per year for each employee that was eliminated.

Question 3:

Referring to the spreadsheet supplied with this TMA, explain how and why these needs for benefits and resources have been incorporated into the spreadsheet model.
On the basis of your analysis, would you recommend Whirlpool Corporation to proceed with the implementation of the proposed ERP system? Explain how you have used the information in the spreadsheet model to arrive at your recommendation.

With a 9% cost of capital used to discount the ERP project and a 40 % tax rate faced, Whirlpool Europe introduced a predicted (Incremental Cash Flows and Valuation) in case of implementing "Project Atlantic" with the following components:

- **Capital Expenditure:** this part is concerned with cash payments made to acquire additional fixed assets and with cash receipts from the disposal of fixed assets (in this case equipments and software license for the new system). For Whirlpool Europe, $ 4.9 millions would be needed to spend for capital equipment in 1999, rise to $ 8.9 millions in 2000, and then decreased to $ 6.9 millions in 2001(the real start for the project) and $ 4.1 millions in 2002. The cost for software licenses would be $ 6 and $ 3 millions in 1999 and 2000. The capital equipment would be depreciated in equal amounts over five years, figure below shows changes happened to capital expenditure.

- **Cash Flow:** ERP system and process changes would enable the company to realize an increase of units sales equal to 25% of the implementation in product availability, those incremental sales were predicted to contribute to increasing the profitability of Whirlpool Europe, the company forecasted a 0.25 % gross margin increase by the second year after implementation. ERP system was expected to simplify the management of customer orders. An 18 % reduction in the 79 desk employees at an average cost of $ 40.00 per year per employee was expected to once the system was implemented; it would also simplify the Accounting functions and result in a 15 reduction in the 60 finance employees. As we can notice from the spreadsheet; cash flow value was minus (-8,717 and –8,003) in the first two years 1999 and 2000, becoming positive (+1,298) in 2001, then increased until it reached the peak in 2003 with $ 13,996 millions.

  [redacted], cash flow from operations have been changed several times during implementation of ERP system, in the first two years (1999 and 2000) the value was minus (-3,817 and – 1.788) because the total costs of the implementation exceed revenues. The following equation helps us to estimate cash flow of "Project Atlantic" each year: -

  Cash flow = Capital expenditure + Cash flow from operations + Reduction in need for inventory

- **Discount Rate:** one major value in the spreadsheet, it is the result of discount rate on the NPV calculation the effects decision, changing the discount rate value affect all other components specially the NPV, that is if the discount rate increase the NPV will decrease as a result of the correspond relation between them. In the spreadsheet NPV value was 9%, so recommendations are to accept the project and start the implementation of ERP system.

- **Sum of Discounted Cash Flows or (NPV) of Whirlpool:** this value has major effects on all other values incorporated in the spreadsheet, the relation between them is clear since we can't calculate the net benefit (that is NPV) without finding total costs and revenues, this in turn will help us in decision making process, to calculate NPV the following equation is used: -

PV (of a year n) = FV/ (1+ r) ^n

If the NPV value was positive, the project should be considered for a "go" decision, if it was negative, recommendations are surely not to implement this project. The following schedule calculates the NPV for ERP system:

Time	Cash flow (US$000s)	Calculation of PV (Discount rate=%9)	PV (US$000s)
Immediately (time0)	-8717	(8717)/(1+.09)^0	-8717
1 year's time	-8003	(8003)/(1+.09)^1	-7343
2 year's time	1298	1298/(1+.09)^2	1092
3 year's time	8621	8621/(1+.09)^3	6657
4 year's time	13996	13996/(1+.09)^4	9915
5 year's time	12504	12504/(1+.09)^5	8127
6 year's time	10181	10181/(1+.09)^6	6071
7 year's time	7959	7959/(1+.09)^7	4354
8 year's time	7426	7426/(1+.09)^8	3727
NPV			23883

In conclusion, it appears from the calculation that the Net Present Value is positive (23883), thus I think the project is going to be succeeded and recommend to be implemented. This will benefit the corporation meaning it will provide annual profit.

The IRR value of 34.78% is the discount rate that, when applied to the future cash flows of a project, will produce an NPV of zero. In the spreadsheet IRR value is 34.78%, the following calculates IRR: -

IRR = r % (when PV = 0)

Question 4:

Suppose that instead of the values incorporated in the spreadsheet, the ERP innovation was evaluated with amended values reflecting the following:
- The cost of capital is expected to be 15%
- The tax rate could well rise to 50%
- A shorter time horizon is envisaged, reflecting the dynamics of technology: benefits and costs beyond 2004 should not be taken into account.

What would you recommend Whirlpool Corporation to do in these circumstances? Following your revised spreadsheet analysis, explain how your recommendation has been influenced by the revisions. NB: You should make a copy of the spreadsheet and produce, print and submit to your tutor a revised version showing the incorporation of the changes described in (a), (b) and (c). You must add your name and Personal Identifier within the printed area of your spreadsheet to ensure that your own work can be identified.

Discount Rate	9.00%
Profits Tax Rate	40.00%

Description	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*
Capital Expenditure	-4900	-8900	-6900	-4100					
Revenue		7848	23964	42074	51346	56551	58041	58041	58041
Cost of Goods sold		-6590	-19358	-33936	-40989	-45050	-46377	-46377	-46377
Operating Expenditures	-6361	-4892	-4395	-3745	-700	-243	103	134	166
Depreciation Expense		-980	-2760	-4140	-4960	-4960	-3980	-2200	-820
Taxable Earnings	-6361	-4614	-2549	253	4697	6298	7787	9598	11010
Taxes	-2544	-1846	-1020	101	1879	2519	3115	3839	4404
Earnings after Taxes	-3817	-2768	-1529	152	2818	3779	4672	5759	6606
add back Depreciation		980	2760	4140	4960	4960	3980	2200	820
Cash Flow from Operations	-3817	-1788	1231	4292	7778	8739	8652	7959	7426
Reduction in need for Inventory		2685	6967	8429	6218	3765	1529		
Cash Flow	-8717	-8003	1298	8621	13996	12504	10181	7959	7426
Discount Factor	1.0000	0.9174	0.8417	0.7722	0.7084	0.6499	0.5963	0.5470	0.5019
Discounted Cash Flow	-8717	-7343	1092	6657	9915	8127	6071	4354	3727
Sum of Discounted Cash Flows	23883								
Rate at which Sum of Discounted Cash flows would be zero	34.78%								

By increasing the cost of capital from 9% to 15%, raising the tax rate up to 50% instead of 40%, many values were modified accordingly reflecting those changes as the table below.

One major change happened to original NPV value; it was 23.88 and become 5.824, which mean that there is a relation that can be seen as the follow: where the discount rate is zero, the NPV will be the sum of the net cash flows; no account is taken of the time value of money. However, as the discount rate increase there is a corresponding decrease in the NPV of the project. Other values were also amended such as taxes, earnings after taxes and cash flow from operations .The following table and figures shows NPV before and after changing discount rate and tax rate:

Incremental Cash Flows and Valuation
(US$000s)

Discount Rate	15.00%
Profits Tax Rate	50.00%

Description	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*
Capital Expenditure	-4900	-8900	-6900	-4100					
Revenue		7848	23964	42074	51346	56551	58041	58041	58041
Cost of Goods sold		-6590	-19358	-33936	-40989	-45050	-46377	-46377	-46377
Operating Expenditures	-6361	-4892	-4395	-3745	-700	-243	103	134	166
Depreciation Expense		-980	-2760	-4140	-4960	-4960	-3980	-2200	-820
Taxable Earnings	-6361	-4614	-2549	253	4697	6298	7787	9598	11010
Taxes	-3181	-2307	-1275	127	2349	3149	3894	4799	5505
Earnings after Taxes	-3181	-2307	-1275	127	2349	3149	3894	4799	5505
add back Depreciation		980	2760	4140	4960	4960	3980	2200	820
Cash Flow from Operations	-3181	-1327	1486	4267	7309	8109	7874	6999	6325
Reduction in need for Inventory		2685	6967	8429	6218	3765	1529		
Cash Flow	-8081	-7542	1553	8596	13527	11874	9403	6999	6325
Discount Factor	1.0000	0.8696	0.7561	0.6575	0.5718	0.4972	0.4323	0.3759	0.3269
Discounted Cash Flow	-8081	-6558	1174	5652	7734	5903	4065	2631	2068

Sum of Discounted Cash Flows	14588
Rate at which Sum of Discounted Cash flows would be zero	34.78%

Figure 1.1: Discount Rate (9.00%), Profits Tax Rate (40.00%)

Time	Cash flow	Discount factor	Present value
1999	-8717	1	-8717
2000	-8003	0.9174	-7343.
2001	1298	0.8417	1092
2002	8621	0.7722	6657
2003	13996	0.7084	9915
2004	12504	0.6499	8127
2005	10181	0.5963	6071
2006	7959	0.5470	4354
2007	7426	0.5019	3727
The net present value NPV = 23883 (positive)			

Figure 1.2: Discount Rate (15.00%), Profits Tax Rate (50.00%)

Time	Cash flow	Discount factor	Present value
1999	-8081	1	-8081
2000	7542	0.8696	-6558
2001	1553	0.7561	1174
2002	8596	0.6575	5652
2003	13527	0. 5718	7734
2004	11874	0.4972	5903
2005	9403	0.4323	4065
2006	6999	0.3759	2631
2007	6325	0.3269	2068
The net present value NPV = 14588 (positive)			

From the previous discussion, figure 1.2 shows that although the net present value in both cases is positive (that means the implementation of ERP on Whirlpool Europe will be successful) but at a longer period of time (beyond 2003) NPV will decreased (from 23883 to 14588), recommendations for this company to implement ERP system as it will result in more profits.

Business graduate skills outcome	**Example of how work on this TMA has contributed to my skills development**	**Self-assessment of current level of skill – high/medium/low; any actions to be taken**
Using examples and analyzing case studies to enhance understanding, support conclusions and illustrate issues concerning business functions in organizational contexts	By analysis the sheets in the case study. I could determine the benefits of utilizing the proposed software.	High.
Problem solving and decision making	I tried to analyze the whole spread sheets.	Medium. I will discuss it with my tutor.
Understanding the way in which numbers are used in the core business functions	I tried to understand the concept of the business functions.	Low. I need to read more about the business function.
Interpreting spreadsheets for managing numbers and quantitative analysis	I used the calculation to evaluate the benefits of the new (ERP) software per the spread sheet for Whirlpool corp.	High.

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References:

- *http://www.whirlpoolcorp.com/*
- *Whirlpool case study, Block 3 and Hard Reading: (O'Brien)*
- *Adam & McAlarey Ch5, 10 and Whirlpool Europe case study*