PERFORMANCE MANAGEMENT

PROFESSIONAL LEVEL EXAMINATION

SAMPLE PAPER 2021

NOTES:

You are **required** to answer **Questions 1 - 5**.

TIME ALLOWED:

3 hours, plus 10 minutes to read the paper.

INSTRUCTIONS:

This is a closed-book examination.

Marks for each question are shown. The pass mark required is 50% in total over the whole paper.

You are reminded that candidates are expected to pay particular attention to their communication skills and care must be taken regarding the format and literacy of the solutions. The marking system will take into account the content of your answers and the extent to which answers are supported with relevant legislation, case law or examples, where appropriate.

PERFORMANCE MANAGEMENT

PROFESSIONAL LEVEL EXAMINATION – SAMPLE PAPER 2021

Question 1

Zirconia Electronics Ltd. (ZEL) manufactures and sells a component ("CP1") which is used by other firms in the manufacture of security devices. ZEL operates a single factory in Galway, and each year the company aims to maximise its profits. The Galway factory has the capacity to manufacture up to 5,000 units of CP1 per annum, but market conditions are such that (in order to sell a larger quantity) the selling price per unit must be reduced. The following information is available regarding the Galway factory:

Number of units of CP1 produced & sold, per annum	1,000	2,000	3,000	4,000	5,000
Selling price per unit	€47	€43	€39	€36	€33
Total cost	€23,000	€50,000	€80,000	€113,000	€153,000

ZEL now has an additional opportunity to acquire a factory in Athenry. If this acquisition is made, then the Galway and Athenry operations would operate as two separate divisions and each division would be evaluated as a profit centre. The Galway division could (if it wished) continue to sell some or all of its production of CP1 on the open market to its existing customers. It would also be possible for the Galway division to sell units of CP1 to the new Athenry division.

The Athenry division would use one unit of CP1 in the manufacture of unit of the Athenry division's product, which is called the "auto alarm kit" (AAK). It can be assumed that the Galway division is the only possible source of supply of the CP1.

The Athenry division has a maximum production capacity of 4,000 AAKs per annum. The division believes that it can sell any quantity of AAKs up to this level at a price of €82 each through its online store. Total costs in the Athenry division, before taking account of the transfer price paid to the Galway division, would be as follows:

Number of units of AAK produced, per annum	1,000	2,000	3,000	4,000
Total costs	€42,000	€87,000	€138,000	€195,000

REQUIREMENT:

(a) In answering this part, assume that the Athenry factory is <u>not</u> acquired and that ZEL therefore consists solely of its Galway operations.

Present an analysis to show what quantity of CP1 would be produced per annum, and how much profit would be earned, assuming ZEL maximises the profitability of its Galway operations.

(8 marks)

(b) Assume now that the ZEL <u>does</u> acquire the Athenry operation, and that the company adopts the divisionalised structure outlined above (i.e., <u>Galway</u> and <u>Athenry</u> divisions). Assume also that the objective is to maximise the overall profits of ZEL.

In these circumstances, present an analysis to indicate how many units of CP1 should be produced in Galway <u>and</u> what should be done with these units (i.e., how many units of CP1 should be sold on the open market, and how many should be transferred to the Athenry division).

(14 marks)

(c) After the divisionalised company was established, the managers of the Galway and Athenry divisions agreed a transfer price of €33 per unit of CP1 transferred between them.

Show whether this transfer price will motivate each of the division managers to act in the best interests of ZEL as a whole.

(8 marks)

(<u>Total</u>: 30 Marks)

Question 2

Ireland Ltd. produces merchandise designed to appeal to supporters of team sports. As an example, the company's CEO has told you about a Supporters Kit (SK) which the company intends to manufacture in connection with a football tournament for which the national team has recently qualified. The kit contains the national flag plus a headband and will retail for €3.50. Demand for the SK will depend on how much progress the national team makes in the forthcoming tournament, as follows:

	If the team is knocked out in the 1st round	If the team is knocked out in the 2nd round	If the team qualifies for the 3rd (and final) round
Cumulative demand for the SK	10,000 units	18,000 units	25,000 units

The CEO estimates that there is a 0.7 probability that the team will qualify for the 2nd round and a 0.65 probability that it will qualify for the 3rd (and final) round.

The CEO has asked for your advice in relation to the scheduling of production. She is considering three alternative possibilities:
1. To manufacture 10,000 SKs initially, and then produce additional batches as necessary if and when the team qualifies for each of the two subsequent rounds of the competition. This would avoid any risk of the company being left with unsold SKs.

2. To manufacture 10,000 SKs initially. If the team qualifies for the second round, then the company manager would immediately manufacture one further large batch of 15,000 SKs. This further batch would enable Ireland Ltd. to meet demand in full at the second round and (if applicable) the third round.

3. To manufacture 25,000 SKs before the beginning of the tournament so that the company will have sufficient inventory to meet demand should the team progresses to the final of the tournament.

At first, the CEO was inclined towards the first of these three options so as to avoid any risk of being left with unsold inventory if the team makes an early exit from the tournament. However, her production manager has suggested that it may be worth taking the risk of producing in bigger batches because there is a batch cost of €5,100 in manufacturing any batch, irrespective of how many units it consists of. There is also a variable manufacturing cost of €1.50 per unit of SK.

REQUIREMENT:

(a) Prepare a payoff table to show the possible outcomes of the decision facing the CEO of Ireland Ltd.

(14 marks)

(b) Critically evaluate whether using expected values would be an appropriate means for Ireland Ltd. to choose between the three alternatives in this case. Justify your answer fully.

(5 marks)

(c) Which of the three options (1, 2, or 3 above) would maximise the company's expected value from this decision? Provide detailed calculations to support your answer.

(6 marks)

(Total: 25 marks)

Question 3

Commercial Driver Training (CDT) Ltd. operates a training school where students attend courses which prepare them for driving tests which they must pass in order to drive certain types of heavy commercial vehicles such as buses and trucks. Many students are sponsored by employers and/or attend CDT on the recommendation of friends and colleagues who have previously studied at the school. Consequently, the senior management at CDT Ltd. believes that consolidating the school's reputation for quality is essential in order to ensure the school's long-term financial success.

This belief provided the starting point for a new strategy which was implemented for the first time in the 2020 financial year. The strategy involved increased expenditure on marketing and staff training; increased provision of driving simulation software for students; significant enhancement of the school's website (especially for enrolment and other administrative tasks); and more aggressive negotiations with landlords so as to obtain better quality teaching venues at more competitive rents. One way in which CDT funded these changes was through reductions in salaries for all staff members, which the staff accepted in return for guarantees of job security.

In the financial years 2019 and 2020, CDT's profits were as follows:

	2019	**2020**
Sales	€575,000	€565,000
Teaching staff salaries	(€240,000)	(€210,000)
Administrative staff salaries	(€122,000)	(€115,000)
Marketing costs	(€21,000)	(€27,000)
Costs of staff training	(€10,000)	(€15,000)
Software costs (driving simulation and website development)	(€30,000)	(€54,000)
Student enrolment and administration costs	(€20,000)	(€8,000)
Rents	(€62,000)	(€60,000)
Net profit	**€70,000**	**€76,000**

The following nonfinancial metrics are also available for the two years:

	2019	**2020**
Percentage of CDT students achieving first-time passes in the driving tests for which their courses prepared them.	55%	67%
Repeat business percentage (see Note 1 below)	70%	80%
Staff turnover	4%	4%
Student complaints about quality of courses	30	10
Student complaints about software issues (driving simulation and website)	70	125

Note 1: "Repeat business percentage": This refers to the percentage of students who (when they <u>fail</u> a driving test after taking a course at CDT) choose to repeat that course at CDT with a view to subsequently repeating their test. CDT gives such students a 30% discount on the normal course fees.

REQUIREMENT:

(a) Evaluate the performance of CDT in 2020, including its progress in relation to the implementation of its new strategy, using only the <u>financial</u> indicators provided above.

(6 marks)

(b) Extend your analysis from part (a) by making full use of the <u>nonfinancial</u> indicators provided above, and explain why it is necessary to use a combination of financial and nonfinancial indicators in order to assess the company's strategic performance. Your answer should also include suggestions for expanding the range of performance indicators so as to facilitate them in managing the implementation of their strategy.

(14 marks)

(<u>Total</u>: 20 Marks)

Question 4

Glassford Ltd. manufactures a single product which requires three types of raw material. The product and raw materials are perishable, and so no inventories are held. A total of 2,350 batches of output were produced last month. The following table shows the <u>standard</u> raw materials cost of producing one batch of output:

Raw material	Number of kilograms	Price per kg.	Totals
A	13	€2	€26
B	7	€5	€35
C	5	€6.40	€32
Total:	**25 kilograms**		**€93**

The general manager of Glassford Ltd. explained that, during last month, she exercised her discretion to vary this raw materials mix. She also liaised regularly with suppliers to ensure that they always provided Glassford with the freshest raw materials, and even paid them a small price premium per kilogram on occasions for doing so. These actions formed part of a deliberate decision on her part to maintain and improve the quality of the product and she believes that they were financially justified. The following table shows <u>actual</u> data about the total amounts of raw materials purchased and the costs involved during last month:

Raw material	Number of kilograms	Price per kg.	Totals
A	20,000	€2.10	€42,000
B	19,000	€5.20	€98,800
C	15,000	€6.30	€94,500
Total:	**54,000 kilograms**		**€235,300**

REQUIREMENT:

(a) Carry out a detailed variance analysis in relation to raw materials for Glassford Ltd. for last month in as much detail as is possible from the information provided.

(10 marks)

(b) Do you agree with the general manager that her actions in relation to raw materials were financially justified? Justify your answer, making use of the results of the variance analysis conducted in part (a) above <u>and</u> explaining what additional information would enable you to answer part (b) more fully.

(5 marks)

(<u>Total</u>: 15 Marks)

Question 5

(a) A manufacturing company has estimated its monthly production overhead costs using a multiple regression model. Brief details of the model are as follows:

Dependent variable:	Production overheads costs (POC).
Independent variables:	Direct labour hours (DLH). Machine hours (MH) Factory floor area (FA).
R-squared:	0.97

The company's management accountant has stated that he believes that there may be multicollinearity in this model.

REQUIREMENT:

(a) Explain what is meant by the problem of multicollinearity, and explain why multicollinearity may result in a multiple regression model giving an unreliable estimate of production overhead costs.

(5 marks)

(b) Define the term "Internet of Things" (IOT) and explain one example of how IOT is likely to affect the work of CPAs in future years.

(5 marks)

(Total: 10 Marks)

THE INSTITUTE OF CERTIFIED PUBLIC ACCOUNTANTS IN IRELAND

PERFORMANECE MANAGEMENT

PROFESSIONAL LEVEL EXAMINATION – SAMPLE PAPER 2021

Question 1: Zirconia Electronics Ltd.

Part (a)

- Galway operations:

	TC	TR	MC	MR
1,000	€23K	1,000 * €47 = €47K	€23K	€47K
2,000	€50K	2,000 * €43 = €86K	50 – 23 = €27K	86 – 47 = €39K
3,000	€80K	3,000 * €39 = €117K	80 – 50 = €30K	117 – 86 = €31K
4,000	€113K	4,000 * €36 = €144K	113 – 80 = €33K	144 – 117 = €27K
5,000	€153K	5,000 * €33 = €165K	153 – 113 = €40K	165 – 144 = €21K

- MR > MC up to and including **3,000** units of output ➔ optimum.

- Profit = TR €117,000 – TC €80,000 = €37,000.

Part (b)

- Summary of MC and MR in various uses:

	MC in Galway *from Part A*	MR Galway External Sale *from Part A*	<< **OR:** Transfer to Athenry >>			
			Total costs in Athenry	Total revenue in Athenry	Net revenue in Athenry	Net MARGINAL revenue in Athenry
1,000	€23K	€47K	€42K	1,000*€82 = €82K	82-42 = €40K	€40K
2,000	€27K	€39K	€87K	2,000*€82 = €164K	164-87 = €77K	77-40 = €37K
3,000	€30K	€31K	€138K	3,000*€82 = €246K	246-138 = €108K	108-77 = €31K
4,000	€33K	€27K	€195K	4,000*€82 = €328K	328-195 = €133K	133 – 108 = €25K
5,000	€40K	€21K	<< Exceeds maximum capacity >>			

- Optimal output plan (ZEL overall perspective):

	MC in Galway *from Part A*	MR Galway External Sale *from Part A*	MR after Athenry transfer *from Part B*	**Optimum choice**
1,000	€23K	€47K	€40K	Galway (€47K > €40K > MC)
2,000	€27K	2nd external ➐ €39K	1st transfer ➐ €40K	Transfer (€40K > €339K > MC)
3,000	€30K	2nd external ➐ €39K	2nd transfer ➐ €37K	Galway (€39K > €37K > MC)
4,000	€33K	3rd external ➐ €31K	2nd transfer ➐ €37K	Transfer (€37K > €339K > MC)
5,000	**€40K**	3rd external ➐ €31K	3rd transfer ➐ €31K	**Don't produce** (MC > MR in Galway AND Athenry)

- Summary: Optimal output = 4,000 units of CP1, of which 2,000 sold externally by Galway and 2,000 transferred to Athenry.

Part (c)

Decision by **Galway Division**

	MC in Galway *from Part A*	MR Galway External	OR: MR from transfer to Athenry	Choice by Galway division
1,000	€23K	€47K	1,000*€33 = €33,000	External (€47K > €33K > MC)
2,000	€27K	2nd external ❼ €39K	€33,000	External (€39K > €33K > MC)
3,000	€30K	3rd external ❼ €31K	€33,000	Transfer (€33K > €31K > MC)
4,000	€33K	3rd external ❼ €31K	€33,000	**Indifferent OR Transfer** (Transfer €33K = MC €33K)
5,000	€40K	3rd external ❼ €31K	€33,000	Don't produce (MC > MR in Galway OR MR from transfer)

Hence:

- **Galway Division** will **want** to produce 2,000 units for external sale and 1,000 units for transfer; will be **willing** to produce another 1,000 units for transfer if desired by Athenry Division (no gain/loss to Galway Division on this additional batch of 1,000 units).

Decision by **Athenry Division**

	Net MR in Athenry *from Part B*	Price paid to Galway for transferred CP1s *from above*	Choice by Athenry division
1,000	€40K	€33K	Produce (€40K > €33K)
2,000	€37K	€33K	Produce (€37K > €33K)
3,000	€31K	€33K	DON'T Produce (€31K < €33K)
4,000	€25K	€33K	DON'T Produce (€25K < €33K)

Hence:
- **Athenry Division** will want to produce 2,000 units of AAK. It will be able to do so because (as shown above) Galway Division will want to provide 1,000 units for transfer to Athenry **and** will be willing to produce another 1,000 units for transfer since they are desired by Athenry Division (no gain/loss to Galway Division on this second batch of 1,000 units).

- Thus the two divisions, when they act in their own interest, will make the decisions which maximise the overall profits of ZEL (as shown in Part [b] above).

Part (a)

Payoff table:

	Knocked out in 1st round	Knocked out in 2nd round	Qualifies for the 3rd (and final) round
Option #1: Produce up to 3 separate batches	Revenue: (10,000 * €3.50 = €35,000). Cost: €5,100 + (10,000 * €1.50) = €20,100. Payoff = €14,900.	Revenue: (18,000 * €3.50 = €63,000). Cost: €20,100 + €5,100 + (8,000 * €1.50) = €37,200. Payoff = €25,800.	Revenue: (25,000 * €3.50 = €87,500). Cost: €37,200 + €5,100 + (7,000 * €1.50) = €52,800. Payoff = €34,700.
Option #2: Produce up to 2 separate batches	Revenue: = €35,000). Cost: = €20,100. Payoff = €14,900.	Revenue: = €63,000. Cost = €20,100 + €5,100 + (15,000 * €1.50) = €47,700. Payoff = €15,300	Revenue: = €87,500. Cost = €47,700. Payoff = €39,800
Option #3: Produce a batch of 25,000 units	Revenue: (10,000 * €3.50 = €35,000). Cost: €5,100 + (25,000 * €1.50) = €42,600. Payoff = LOSS €7,600.	Revenue: (18,000 * €3.50 = €63,000). Cost: = €42,600. Payoff = €20,400.	Revenue: (25,000 * €3.50 = €87,500). Cost: = €42,600. Payoff = €44,900.

Part (b)

- The expected value (EV) method seems to be the most appropriate way of dealing with the uncertainty in this case.

- The EV method is designed to maximise the "long run average" payoff from a decision. This approach is appropriate when (as is apparently the situation in this case) the decision is one which is typical of decisions taken regularly by the decision-maker (we are told that this is "an example" of the merchandising manufacturing which the company engages in, and is specific to one particular competition and even to the degree of progress which the team makes in it). There will almost certainly be other decisions of a similar type and magnitude on other occasions, so that the law of long run averages can be said to apply in this case and the expected value principle is therefore appropriate.

Part (c)

- To apply the EV method, we need to know the probability of each "state". The states in this case represent particular levels of demand, arising from when the team is knocked out of the competition. States are collectively exhaustive so their combined probability must equal 1. Specifically:

	Knocked out in 1st round	Knocked out in 2nd round	Qualifies for the 3rd (and final) round
Probability	1 – 0.7 = **0.3**	0.7 – 0.65 = **0.05** OR: 1 – 0.3 – 0.65 = **0.05**	**0.65**

- Expected values:

EV (Option 1) = (0.3 * €14,900) + (0.05 * €25,800) + (0.65 * €34,700) = €28,315.

EV (Option 2) = (0.3 * €14,900) + (0.05 * €15,300) + (0.65 * €39,800) = €31,105.

EV (Option 3) = (0.3 * LOSS €7,600) + (0.05 * €20,400) + (0.65 * €44,900) = €27,925.

- Option 2 has the highest Expected Value and should be preferred.

Part (a)

- At the most aggregate level, it is clear that the strategy has paid significant dividends even in the current year (2020). Profit has increased by 8.6% (i.e., from €70K to €76K) despite a small decrease in sales, indicating very effective cost control and improved margins.

- Total expenditures on staff salaries (both teaching and administrative) have decreased and (while this is a cost saving) it is difficult to state in isolation whether this is a good or bad thing. The fact that salaries (for each staff member) have decreased implies that staff numbers have not decreased in line with the reduction in the total salary cost. So it is possible that salary cost savings have been achieved without worsening staff-student ratios. But this cannot be stated with certainty on the basis of the financial data alone.

- It is clear that CDT has spent more on certain items which are consistent with its strategy, e.g.:

- 29% extra on marketing (increased from €21K to €27K); 50% extra on training (€10K to €15K); 80% extra on software (€30K to €54K). However it is not clear from the financial numbers alone what the impact has been, e.g., there has been no positive impact on sales (at least in the current year; the benefits may well come in future years). There has been a significant reduction in student enrolment and administration costs (60%, i.e., from €20K to €8K) and this may be one consequence of the increased software expenditure (e.g., enrolment and administration processes may have gone online and become less costly as a consequence).

- There has been a small reduction in rents (3% i.e., from €62K to €60K). This contributed somewhat to the increase in profit in 2020 but CDT's priority seems to have been to achieve better venues. This may translate into improved sales in a future years (as customers appreciate the quality of the new venues) but there is no tangible evidence of it yet.

Part (b)

- An important benefit of nonfinancial indicators is that they often act as lead indicators of the long-term financial impact of current year actions. For example, the main impact of the decrease in student complaints about quality of courses may be that it improves CDT's reputation for quality and this leads to greater enrolments (and revenues) in future years.

- Also, the use of non-financial measures can reduce the degree of "guesswork" in identifying relationships between financial variables even in the short term.

  - For example, it was suggested in Part (a) that the increased expenditure on staff training <u>might</u> indicate that the considerable reduction in staff costs had been achieved without allowing dis-improvement in staff-student ratios.

  - What appears to confirm this interpretation is the fact that staff turnover has stayed constant in the two years and been minimal (just 4% each year) <u>and</u> the fact that the number of student complaints about quality of courses fell very considerably (from 30 to 10).

- An important lead indicator of future potential revenues is the marked increase in the first-time driving test pass rates (from 55% to 67%). This is probably the measure of success which will be most effective in recruiting students and generating revenues in future years, especially if CDT makes good use of it in marketing. CDT should use this statistic heavily in its promotional efforts.

- Where students fail their tests, it is noticeable that a very high proportion (80% in 2020, compared to 70% in the previous year) take a repeat course at CDT. On the one hand, this may be taken as an indication of course quality: even those students who fail their tests appear not to blame CDT and regard it as worthwhile taking CDT courses again. However, CDT should beware that the reduced fee may be an attraction and CDT should certainly not be relying on this segment to build its revenues. Students who pass first time enhance CDT's reputation; by contrast it is bad for CDT's image if a student fails a driving test even though it is tempting for CDT to think of him/her as a convenient source of revenue in the short term for a repeat course.

- The increase in complaints about software issues (from 70 to 125), including driving simulation and software, is hard to interpret. It is tempting to say that it does not reflect an underlying problem; rather, since CDT has invested heavily in these technologies there are more users and hence more opportunities for system failure and complaint. On the other hand, since the company has chosen to invest in these technologies as a key part of enhancing the customer experience, it is important that CDT should assess the level of customer satisfaction which they are providing.

- Similarly, while CDT is using its negotiating skills (and presumably market conditions) to achieve better rents, the company is (in effect) reinvesting these savings in improved teaching venues in the belief that this enhance customer satisfaction and (ultimately) deliver more sales. There are a lot of assumptions in this line of reasoning and the company should use performance measures to assess the practical impact. For example, is the company increasing its market share and if so are the improved venues a significant reason for this?

Part (a)

Materials Price Variance(MPV):

	Actual Price	Standard Price	Actual Quantity	Variance
A	€2.10	€2	20,000	€2,000 U
B	€5.20	€5	19,000	€3,800 U
C	€6.30	€6.40	15,000	€1,500 F
				Total MPV = €4,300 U

Materials Mix Variance (MMV):

	Actual Quantity, in actual mix	Actual Quantity, in standard mix [13:7:5]	Standard price per kilogram	[AQ in actual mix – AQ in standard mix] * Standard price per kilogram
A	20,000	52% * 54,000 = 28,080	€2	€16,160 F
B	19,000	28% * 54,000 = 15,120	€5	€19,400 U
C	15,000	20% * 54,000 = 10,800	€6.40	€26,880 U
	54,000	54,000		Total MMV = €30,120 U

Materials Yield Variance (MYV):

- Standard raw material cost per batch of output = €93.

- Actual Yield   = 2,350 batches of output
- Standard Yield = 54,000 kg. / 25 kg.   = 2,160 batches of output

- MYV
  = (Actual Yield – Standard Yield) * Standard RM cost per kg of output
  = (2,350 – 2,160 = 190 "extra" batches) * €93
  = €17,670 F.

Part (b)

- Raw material factors alone do not indicate that the action was justified. The costs of improving product quality consisted of the cost of shifting towards a more expensive raw materials (MMV €30,120 unfavourable) plus the net cost of premiums paid to ensure fresher raw materials (MPV €4,300 unfavourable), a combined cost of €34,420. The only evidence in the raw materials costs of the benefit of this strategy is the improved yield, but this gave a benefit of €17,670 (which is only about half of the cost of the actions).

- However in order to answer the question fully it would be necessary to have access to variances arising elsewhere in the value chain which may have arisen as a consequence of the improvement in product quality. For example, improved product quality can often make it possible to achieve favourable sales price and/or market share variances. Also, improved product quality may make it possible to achieve cost savings elsewhere, e.g., there may be favourable labour efficiency variances if the superior raw materials mix is easier for staff to process.

Part (a)

- *Multicollinearity* in a regression model refers to a situation in which two (or more) independent variables in the regression model are highly correlated with each other. For example, it may be the case in this firm that in "busy" months both DLH and MH worked are at higher-than-average levels, while in "slack" months both DLH and MH worked are at <u>lower</u>-than-average levels. Hence these independent variables tend to increase (or decrease) at the same time as each other. The variable floor area is likely to be less correlated with DLH or MH.

- The reason that multicollinearity may result in a multiple regression model giving an unreliable estimate of production overhead costs is as follows: The model is unable to reliably determine the <u>separate</u> effect of a change in each of the independent variables (DLH and MH being the problematic ones) on production overhead costs. The model has a high <u>overall</u> ability to estimate production overhead costs (as indicated by the high R-squared). The reliability of the forecast would be undermined if the levels of DLH and MH were related i.e. changes in DLH are associated with shifts MH. It is difficult for a regression model to estimate the relationship between each independent variable and the dependent variable (POC) *independently* because the independent variables (DLH and MH here) tend to change in unison.

Part (b)

The website Oracle.com defines the Internet of Things (IOT) as follows:

- "The network of physical objects that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet. These devices range from ordinary household objects to sophisticated industrial tools".

One example of how IOT is likely to affect the work of CPAs in future years. (Educators and students please note: Several examples are provided here for illustrative purposes and all answers are considered on merit. Please note that the exam paper asks for ONE example; therefore if candidates give more than one example then they will be marked on their best one only)

- When a manufacturing firm sells Internet-connected devices or products to its customers, the connectedness of those devices will mean that the firm receives detailed information about when (and for how long, and for what purposes) the customer uses those devices. CPAs who are involved in trying to improve the total amount of profit which a firm derives from each product during its product lifecycle will analyse that customer usage data in ways which enable the firm to better identify customer needs and to resdesign products so that they better fit customers' observed usage patterns and preferences. The data may also for example indicate potential problems on older products and offer customers replacement product.

- IOT devices may help CPAs in gathering data on costs. For example, inventories may be tracked through supply chains and delays reduced; staff working hours could be analyzed to determine peak productivity times and/or locate downtime.
- IOT devices could be used to monitor and improve staff health e.g. wearable technology. Happier employees, less sick days, and less staff turnover all impact the bottom line, which is of interest to CPAs.