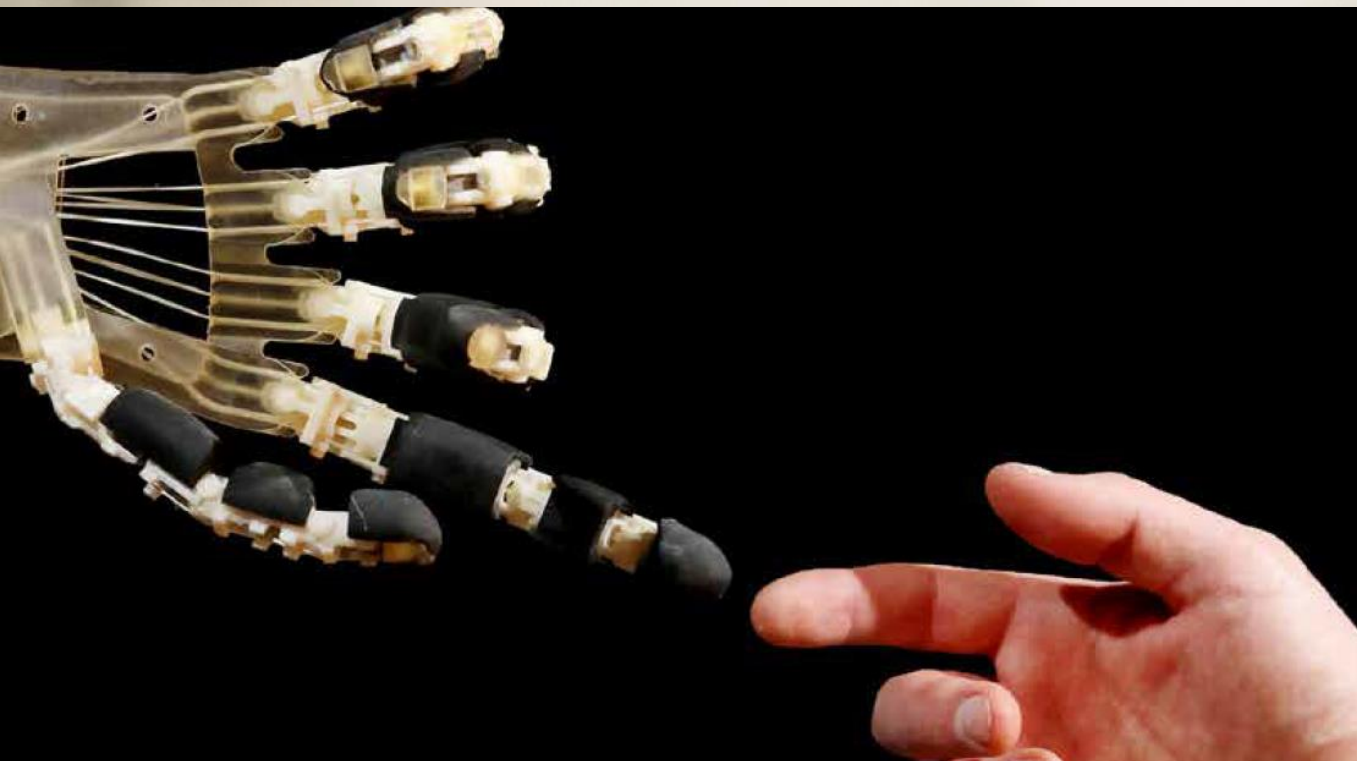




# Fortune Favors the Bold

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PRESENTED BY:

JASON MURPHY

# Manufacturing Investing In Robots

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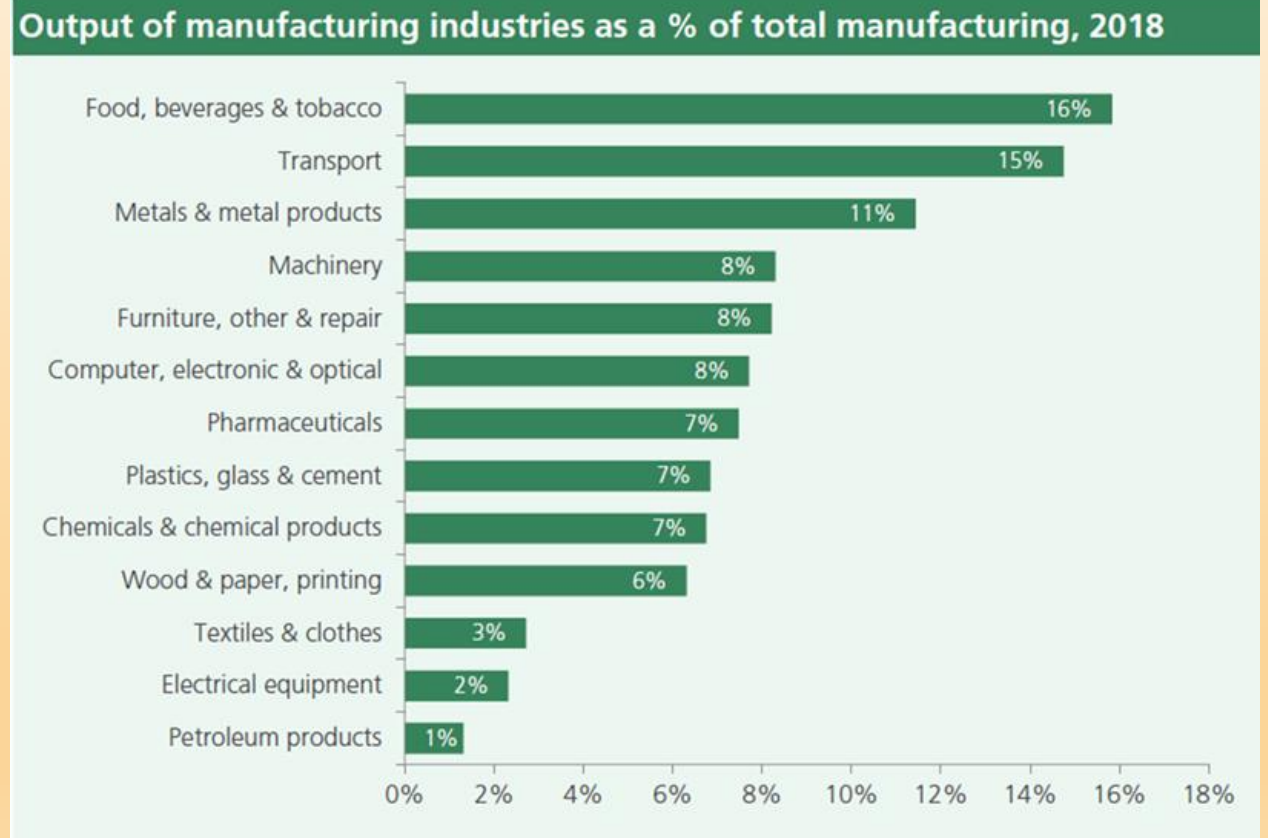
## TOPICS

1. The Sector
2. Why Invest in Robotics
3. Barriers to Adopting Technology
4. Context - The UK Productivity Puzzle
5. The Project
6. Discussion & Conclusions



# 1. The Sector

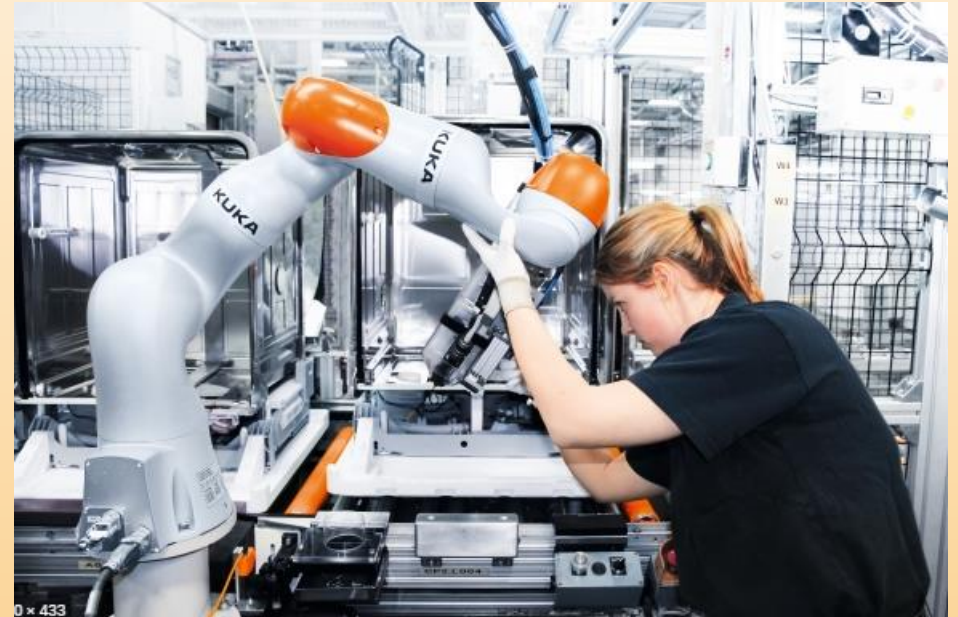
- Sector is the largest Contributor to UK GDP (16%)
- Small profit margins (1% is not untypical)
- Traditionally low investment in new technology
- In 2020, 33% of workforce non UK EU Nationals



## 2. Why Invest in Robots

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- Resilience to labour shortages
- Consistent product quality
- Reduced waste
- Improved productivity



### 3. Barriers to Adopting Technology?

UK Business nominal Return on Capital Investment - 12% (Bank of England 2017)

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Lack of Available Skills

Economic Shocks

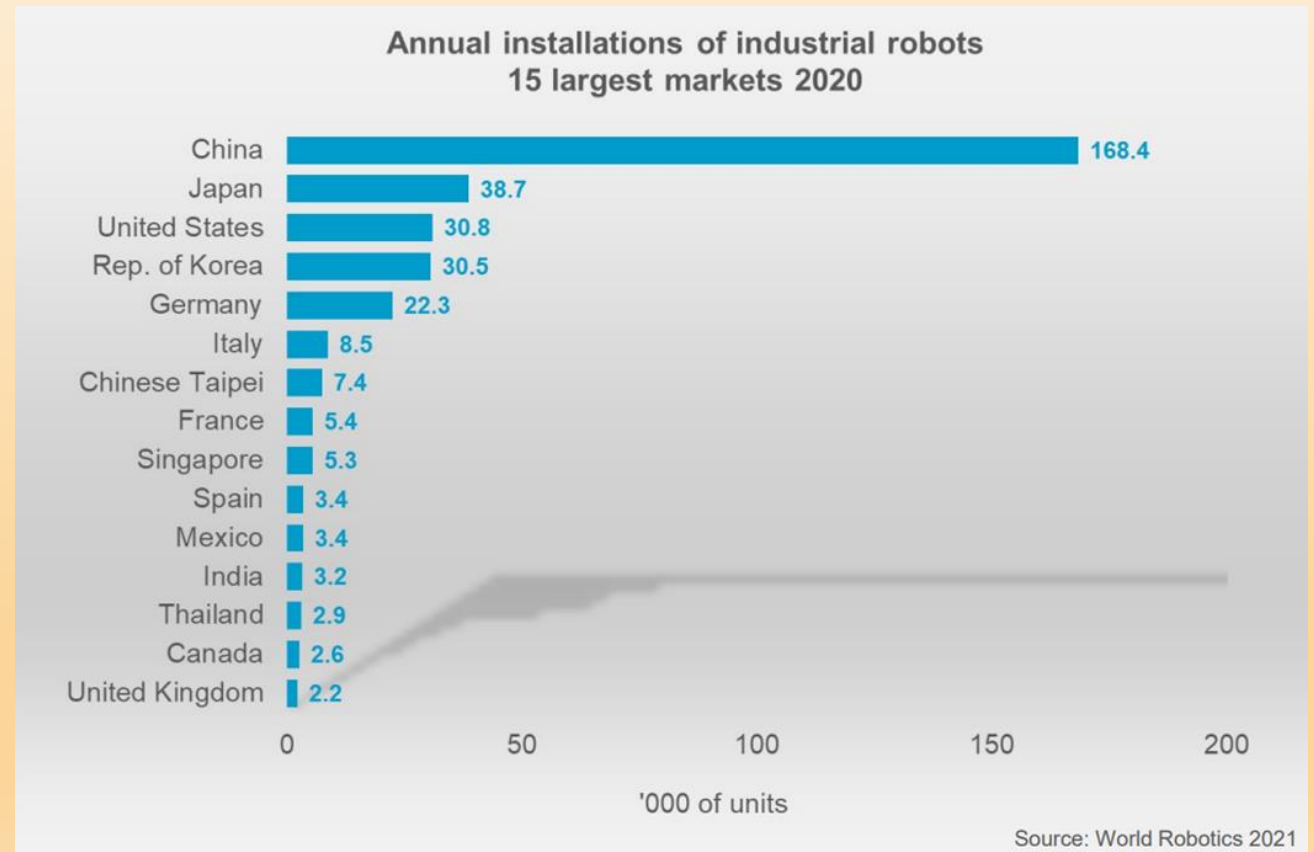
Risk Aversion

Concerns that jobs  
Will be lost

Cost & Financing

+

Lack of Public Funding



# 4. Context - The UK Productivity Puzzle

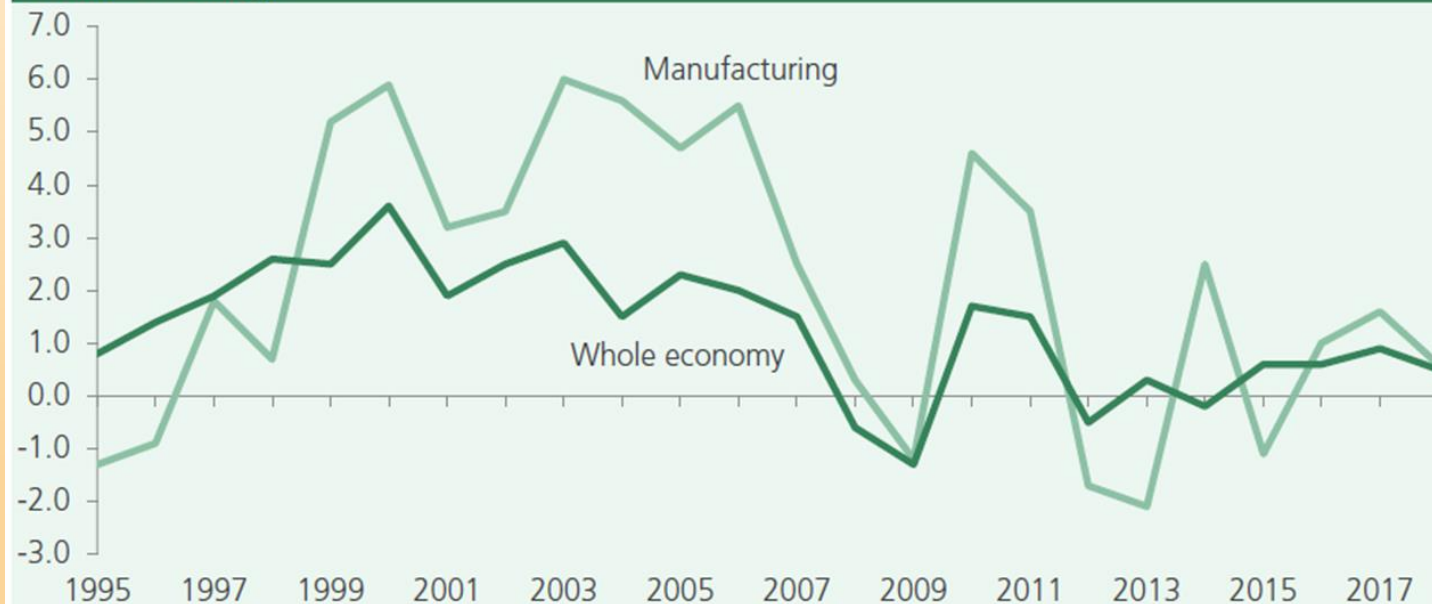


*"It takes all the running you can do, to keep in the same place. If you want to get somewhere else, you must run at least twice as fast as that!"*

- The Red Queen, Through the Looking-Glass

## Productivity growth (output per hour worked)

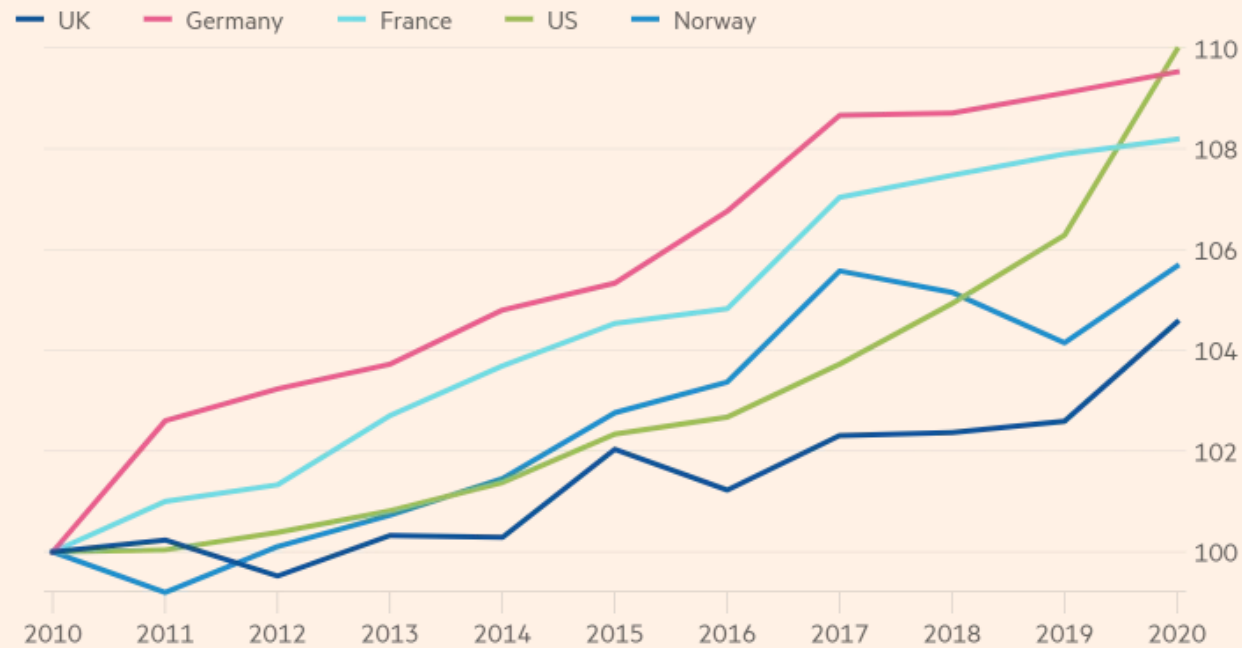
Annual % change



Source: ONS series [DJK8](#) and [LZVD](#)

## UK productivity has lagged that of its peers over the last decade

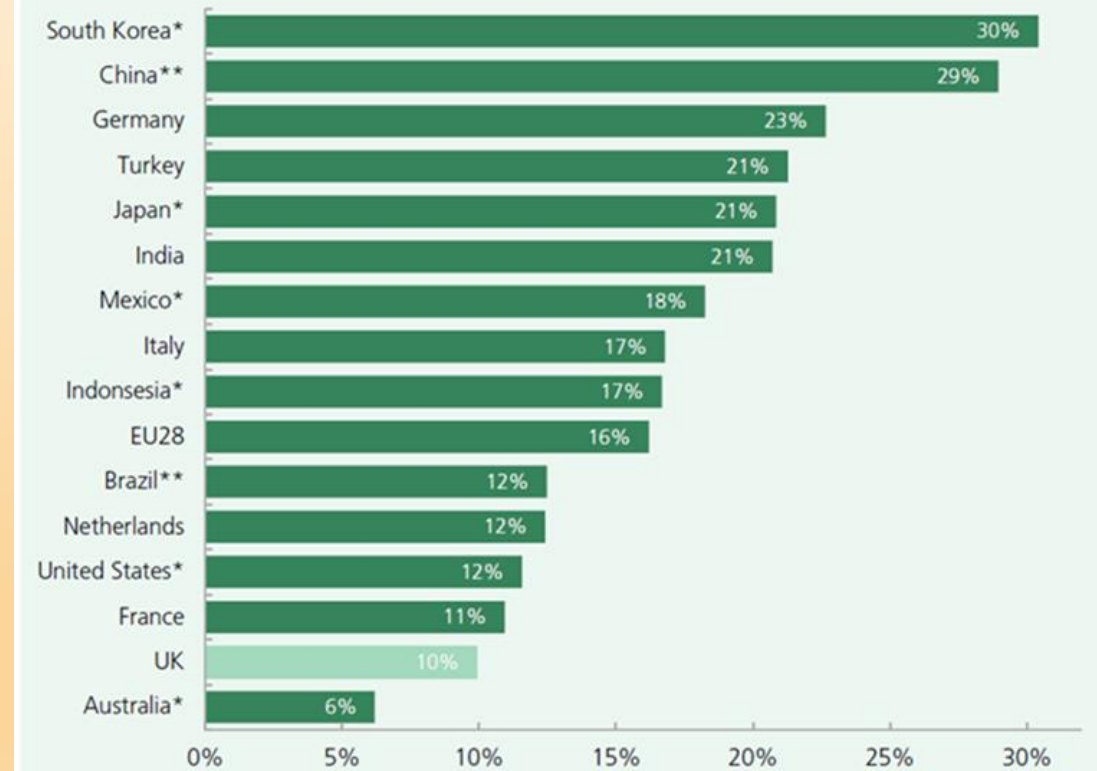
GDP per hour worked (2010 = 100)



Source: OECD

## Manufacturing as a % of GDP

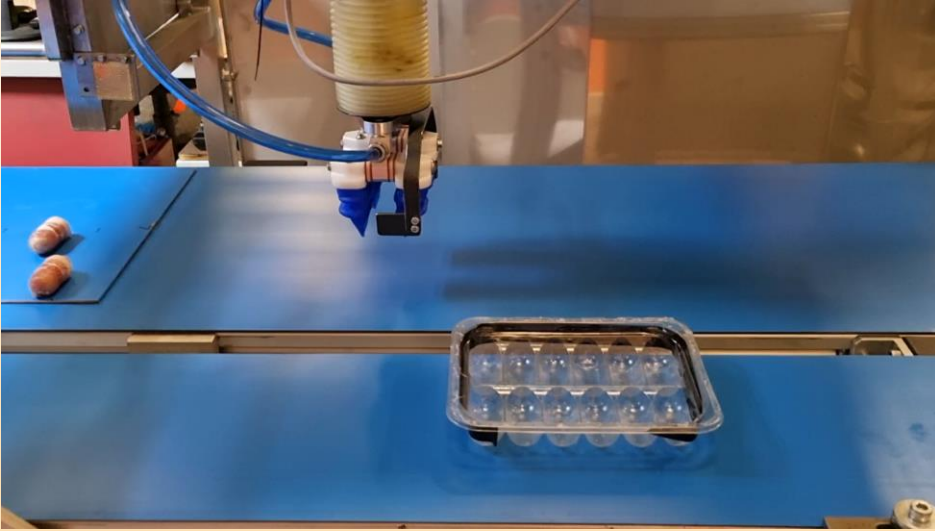
2018, Major OECD countries



Source: OECD, [Value Added by Activity](#), Accessed January 2020

\* = 2017 data; \*\* = 2016 data

## 5. The Project



Pick Rate = 180/minute

Number of Shifts = 3

Number of months in full operation = 9/yr

Number of months mothballed = 3/yr

40 million P in B packets sold per year in UK(12 in a packet)

71 million P in I's processed by this cell (15% of total UK production)



# Project A

## Pick & Place Robot Cell

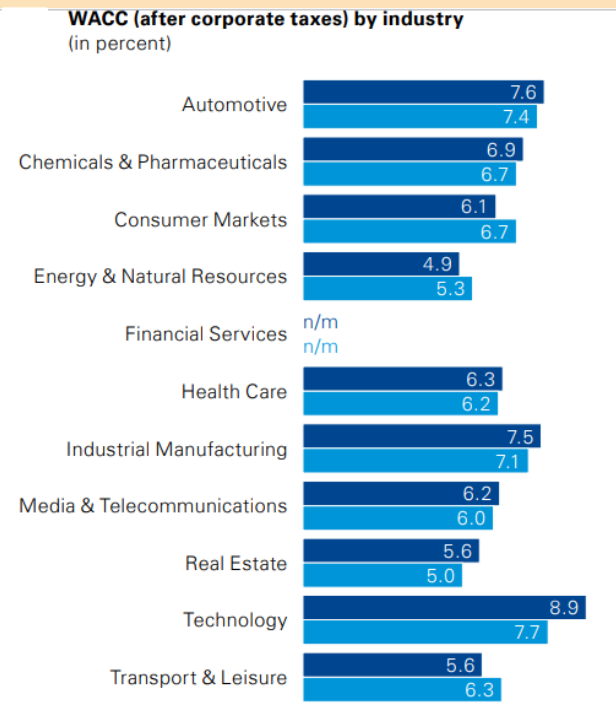
| Project A               |            | Year                |         |         |         |         |         |
|-------------------------|------------|---------------------|---------|---------|---------|---------|---------|
|                         | Investment | 1                   | 2       | 3       | 4       | 5       | 6       |
| Present Value           | (532,000)  | 161,118             | 161,118 | 161,118 | 161,118 | 161,118 | 161,118 |
| Payback                 | 3.3 years  | Manually Calculated |         |         |         |         |         |
| Discount Rate ( WACC)   | 8.00%      |                     |         |         |         |         |         |
| Denominator             | 1.00       | 0.926               | 0.857   | 0.794   | 0.735   | 0.681   | 0.63    |
| Future Value            | (532,000)  | 149,196             | 138,078 | 127,928 | 118,422 | 109,722 | 101,505 |
| NPV                     | 212,850    | PI 1.40             |         |         |         |         |         |
| NPV ( Excel Calculated) | 212,831    | BCR 0.40            |         |         |         |         |         |
| IRR                     | 20.3%      |                     |         |         |         |         |         |
| Residual Value          | 40,000     |                     |         |         |         |         |         |
| ARR                     | 65.50%     |                     |         |         |         |         |         |

| COST                      | £        | BENEFIT/Yr         | £        |
|---------------------------|----------|--------------------|----------|
| Pick & Place Robot        | £410,000 | 6 wages x 3 shifts | £113,400 |
| Conveyor & Stack          | £25,000  | Utlity (3kWh)      | -£3,942  |
| Installation              | £12,000  | Reduced Waste (3%) | £63,860  |
| Service/Maintenance/Parts | £75,000  | 3 month mothball   | -£6,000  |
| Training                  | £10,000  | PPE                | £1,800   |
|                           |          | Cleaning           | -£8,000  |

£.03 Profit on every P in B

|       |          |       |          |
|-------|----------|-------|----------|
| Total | £532,000 | Total | £161,118 |
|-------|----------|-------|----------|

7.1E+07 - P in B produced on this cell  
 4.8E+08 - Total UK Consumption (40 x 10<sup>6</sup> packets)  
 15% of total UK consumption produced on this cell



# Project B - Wrap, Pick & Place Robot Cell

| COST                      | £          | BENEFIT/Yr          | £        |
|---------------------------|------------|---------------------|----------|
| Pick & Place Robot        | £1,150,000 | 12 wages x 3 shifts | £226,800 |
| Conveyor & Stack          | £25,000    | Utility (3kWh)      | -£7,884  |
| Installation              | £12,000    | Reduced Waste (3%)  | £63,860  |
| Service/Maintenance/Parts | £75,000    | 3 month mothball    | -£12,000 |
| Training                  | £10,000    | PPE                 | £3,600   |
|                           |            | Cleaning            | -£14,400 |

£.03 Profit on every P in B

|       |            |       |          |
|-------|------------|-------|----------|
| Total | £1,272,000 | Total | £259,976 |
|-------|------------|-------|----------|

| Project B     |             | Year    |         |         |         |         |         |
|---------------|-------------|---------|---------|---------|---------|---------|---------|
|               |             | 1       | 2       | 3       | 4       | 5       | 6       |
| Investment    | (1,272,000) | 259,976 | 259,976 | 259,976 | 259,976 | 259,976 | 259,976 |
| Present Value | (1,272,000) | 259,976 | 259,976 | 259,976 | 259,976 | 259,976 | 259,976 |

|         |           |                     |
|---------|-----------|---------------------|
| Payback | 4.9 years | Manually Calculated |
|---------|-----------|---------------------|

|                       |       |
|-----------------------|-------|
| Discount Rate ( WACC) | 8.00% |
|-----------------------|-------|

|             |      |       |       |       |       |       |       |
|-------------|------|-------|-------|-------|-------|-------|-------|
| Denominator | 1.00 | 0.893 | 0.797 | 0.712 | 0.636 | 0.567 | 0.507 |
|-------------|------|-------|-------|-------|-------|-------|-------|

|              |             |         |         |         |         |         |         |
|--------------|-------------|---------|---------|---------|---------|---------|---------|
| Future Value | (1,272,000) | 232,159 | 207,201 | 185,103 | 165,345 | 147,407 | 131,808 |
|--------------|-------------|---------|---------|---------|---------|---------|---------|

|     |           |
|-----|-----------|
| NPV | (202,977) |
|-----|-----------|

|    |      |
|----|------|
| PI | 0.84 |
|----|------|

|                         |          |
|-------------------------|----------|
| NPV ( Excel Calculated) | (70,160) |
|-------------------------|----------|

|     |       |
|-----|-------|
| BCR | -0.06 |
|-----|-------|

|     |      |
|-----|------|
| IRR | 6.2% |
|-----|------|

|                |         |
|----------------|---------|
| Residual Value | 100,000 |
|----------------|---------|

|     |        |
|-----|--------|
| ARR | 44.36% |
|-----|--------|

# 6. Discussion & Conclusions

## Discussion

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1. Look at external finance through Innovation Grants and/or Innovation Finance (DBW)
2. Explore options from providers of 'Robots as a Service'
3. There are over 1000 current job vacancies in the Welsh Food & Drink Sector – advanced manufacturing technology is essential to plug the hole.
4. Think carefully about the cost benefit ratio for robots – is the cost for certain functionality justifiable?

## Conclusions

Invest in Project A and not Project B