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Identify how to effectively plan and manage intelligent transport system assets, to enable innovation?

The biggest barrier for Staffordshire County Councils (SCC) ITS team is the limited budget, struggling to maintain the assets to the required level and to keep the assets in a safe condition is a monotonous continual cycle, which disables innovation of the assets. Other local authority colleagues have highlighted similar issues whilst networking at conferences and events. However, there are a few authorities who present their innovative ITS advancements to the industry, which sets the question, how are they managing to do this? The aim of the work-based project is to show a comparison between how SCC and other authorities manage ITS assets. This will highlight where improvements can be made by showing any inconsistencies across the industry. To maintain traffic signal assets to the required standard, equates to reduced costs to enable innovation. The importance of the research is to show the ITS industry more effective ways of working to enable innovation.

The main objectives of the project will be to identify how to:

1. programme asset management effectively.
2. increase innovation opportunities.
3. develop SCC as a leading industry innovator.

These three objectives interlink and can't be done without meeting each one. Successfully meeting objective one will improve working processes. Objective two links back to one, if the assets are being effectively programmed and they still can't be delivered, how can innovation help to further improve that? Being successful with these first two objectives will enable SCC to lead the industry delivering objective three.

Questionnaires

I initially undertook questionnaires to get the quantitative detail to allow more time to find the more detailed answers within the interviews. To limit ambiguity, the names of the authorities will remain anonymous. Due to the nature of different locales of authorities, they have been split into three sub-groups 'Rural', 'City' or 'National'. Their names begin with their sub-group followed by a letter. National Authorities (NA) are those working for National Highways, who run different areas of the strategic trunk road network. The results have been broken down into three sub-groups to see the differences between them. SCC are a rural authority, however, they have been noted separately, to enable the author to compare where their organisation sits in comparison.

The identification of the number of traffic signal and pedestrian assets were totalled, and an average of sites per employee for each authority was calculated.

Question 1 - Average number of sites per employee, per subgroup

WBP name	How many employees make up the ITS team within your authority?	How many assets total do you have?	Average number of sites per employee?	Average number of sites per employee, per subgroup?	
National A	2	147	74	70	
National B	10	670	67		
City council C	1	279	279	55	111
City council D	6	400	67		
City council E	17	892	52		
City council F	6	270	45		
Rural Council G	2	267	134	85	
Rural Council H	9	330	37		
Rural Council I	7	413	59		
Rural Council J	3	302	101		
Rural Council K	5	482	96		
SCC	4	657	164		

A data anomaly was recognised within some of the results for CC C, which is assumed to be due to the size of the city and its population, and because it's not recognised as a popular destination to visit in comparison to the others interviewed. If CC C is disregarded, the results show CC's have the most resource, followed by NA, showing RC have the least amount of resource.

Question 2 - Asset types maintained by each authorities ITS team

WBP name	VMS	CCTV	ANPR	CAR PARK SIGN	TAF's	VAS	BOLLARDS	WEATHER	ZEBRAS	Total	Average
National A										0	1.5
National B	X	X						X		3	
City council C	X									1	2.5
City council D	X	X	X	X						4	
City council E	X			X						2	
City council F	X	X		X						3	
Rural Council G	X			X	X	X				4	4.2
Rural Council H		X				X				2	
Rural Council I	X	X		X			X			4	
Rural Council J	X	X		X		X				4	
Rural Council K	X	X	X	X	X	X			X	7	
SCC	X				X	X				3	

RC's maintain an increased amount of assets of 4.2 average types, when comparing to CC's at 2.5, with NA teams with the lowest amount of types at 1.5

Question 3 - Percentages of junctions and crossings

WBP name	Total % junctions	Junction Average	Total % crossings	Crossing Average
National A	71	74	29	26
National B	78		22	
City council C	24	61	76	39
City council D	70		30	
City council E	58		42	
City council F	56		44	
Rural Council G	42	39	58	61
Rural Council H	48		52	
Rural Council I	36		64	
Rural Council J	37		63	
Rural Council K	30		70	
SCC	27		27	

NA's have the most junctions at 74% average in comparison to the other subgroups, whilst RC have more pedestrian crossings at 61%.

Question 4 - Revenue budget average per sub-region

WBP name	Total Assets	Revenue budget	Revenue average per asset	Sub Region Average
National A	147	NIL	NIL	Unknown
National B	670	Unsure	UNSURE	
City council C	279	£295,000	£1,057	£1,201.32
City council D	400	NIL	NIL	
City council E	892	£1,200,000	£1,345	
City council F	270	Unsure	UNSURE	
Rural Council G	267	£265,000	£993	£1,470.97
Rural Council H	330	£850,000	£2,576	
Rural Council I	413	£510,000	£1,235	
Rural Council J	302	£520,000	£1,722	
Rural Council K	482	£400,000	£830	
SCC	657	£687,000	£1,046	

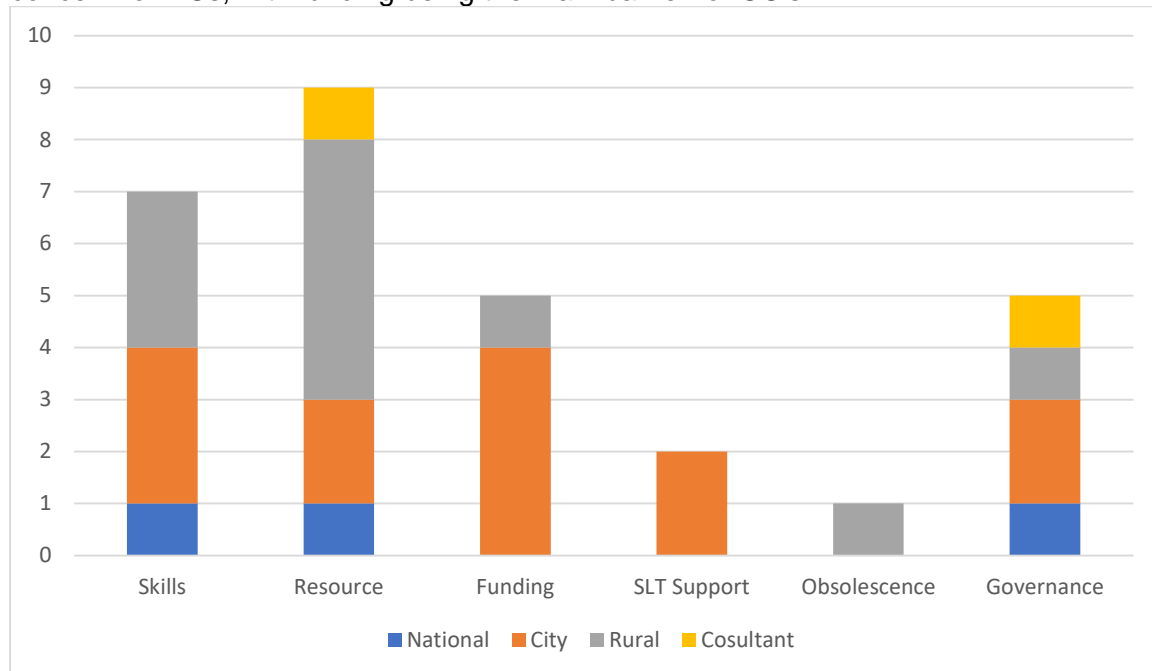
Question 5 - Capital budget average per sub-region

WBP name	Total Assets	Capital budget	Capital average per asset	Sub Region Average
National A	147	£300,000.00	£2,041	£2,041
National B	670	Unsure	Unsure	
City council C	279	£500,000.00	£1,792	£295
City council D	400	£85,000.00	£213	
City council E	892	£600,000.00	£673	
City council F	270	NIL	NIL	
Rural Council G	267	£452,000.00	£1,693	£1,633
Rural Council H	330	£850,000.00	£2,576	
Rural Council I	413	£250,000.00	£605	
Rural Council J	302	NIL	NIL	
Rural Council K	482	£800,000.00	£1,660	
SCC	657	£634,000	£965	

RC's are found to have more revenue spend. Whilst NA's have more capital spend

Interviews

An introductory question was asked 'What are the main barriers you and the team face?' To gain overall thoughts before going into finer detail. Resources were identified to be the main overall barrier faced by all subgroups. However, when looking into detail this was a bigger concern for RCs, with funding being the main barrier for CC's.



The interviews enabled me to identify themes within each of the objectives:

- Objective 1 the themes to enable teams to programme asset management effectively were identified as: Obsolescence, Funding, and Programming techniques.
- Objective 2 - To enable innovation opportunities to be increased were identified as: Innovation support, Policies, and Specific resource.
- Objective 3 – To develop SCC as a leading industry innovator were identified as: Resource, Skills, and Training.

Asset Management

For this objective I identified a research question, 'What are the constraints of ITS asset management?' the recognised constraints are obsolescence, funding, and programming techniques. By rectifying obsolescence in the early stages can eradicate issues. Due to long life cycle planning, suppliers need to stop focusing on competitive advantage and make innovations more cost effective to enable upgrades. Maximising funding will allow assets to be managed effectively, to enable this it was found participants highlighted: interesting ways for authorities to reduce contract costs; increased capital spend with limited revenue to encourage effective design; increased funding bid opportunities, due to high competition; and to evidence asset condition/ working processes through reporting to SLT/ DFT, to promote the priority of traffic signals to enable fair budget allocation/ bid awards. Programming techniques need to be concise and complex to enable efficient asset management, with preference of optimisation analysis tools such as IMTRAC.

Innovation

It was clearly identified innovation is critical in ITS to maximise budgets. To answer, 'How to increase ITS innovation?' the research and literature found the following will increase innovation: SLT support and flexible policies/ procurement. SLT drive's innovation however, according to the research few authorities didn't support innovation which is concerning and

needs addressing. With strict rules highlighted as an issue in public organisations innovation ensures safety, highlighting the importance of smaller innovation and not only focusing on larger innovation.

Competitive Advantage

The identified research question 'Can excelling in innovation identify a competitive advantage?' was answered yes, by enabling efficient resource and skills, and by ranking authorities will enable innovation and gain a competitive advantage. The research found resource is constraining asset management with retention as a key issue due to private sector advantages. Development and progression need to be factored in to retain the experience and skill. Skills are essential due to complex traffic signal design standards and innovation. Specific innovation roles should be considered to gain the competitive advantage. However, the results emphasised the correct authority should lead it and others to follow. Training opportunities have improved in the industry; however, some authorities aren't able to attend which needs highlighting.

Recommendations

Recommendations need to be highlighted to local authorities to allocate more capital budget in comparison to revenue, as the participant analysis has proven it to be an effective way to asset manage. SLT's need to be made aware of the importance of enabling innovation opportunities as they can drive innovation; and training needs are essential for ITS teams to enable effective asset management and to be educated on upcoming innovations; these will both enable a competitive advantage. Internal reporting is recommended for works progressed within the team, showing measures to identify their success and failures, highlighting the performance, providing evidence to SLT. A final internal recommendation is to ensure ITS teams are considering smaller innovation within their asset renewal programmes and not to only concentrate on the larger innovative project, as these can reduce costs.

As well as encouraging internal recommendations, external bodies such as the DFT and suppliers/ contractors need to play their part. The DFT should provide further support to authorities, such as using the National Traffic Signal Report Card as a guide to help understand issues authorities are facing like obsolescence, funding, and condition of assets. Contractors also need to be guided by the DFT/ industry to recommend limiting obsolete equipment to enable cost effective upgrades where possible.

What have I done since finishing the research?

SCC ranked 'last but one' on the amount of resource per asset, further investigation into benchmarking across authorities is already underway. I have used the limited evidence I have gained so far and produces a business case which has been put forward to SCC SLT to increase resource.

Conclusion

Through conducting this research, I have gained a broader understanding of the underlying causes behind poor asset management. Initially, I attributed it to limited resources and funding. However, I have now identified other factors that can contribute to improving asset management without the need for additional funding. While authorities are currently grappling with financial constraints, I believe that providing the right support and ensuring effective program management through innovative approaches can enhance asset maintenance and prolong their lifecycle.

By implementing the internal recommendations at Staffordshire and considering all other identified mitigations, we can optimize our finances and maintain assets to the prescribed standard. Adopting the external recommendations will not only support authorities but also enhance all traffic signal assets across the UK, fostering opportunities for innovation.

Analysis of research Asset Management

Obsolescence	"Equipment would have longer life spans in days gone by, technology is moving so fast making the equipment obsolete quicker"	"Our new contractor took over, but we now have an issue of getting spares and working with the previous contractor"	"Obsolete assets are a never-ending struggle."	"We don't have any obsolete Traffic Signal equipment"
Finances	"We don't have a fair budget for the size of our inventory, money barely covers replacing it in the 15- year term."	"Using innovation now, reduces future costs, although this is a struggle to finance and resource it"	"We share a traffic signal maintenance contract with two other authorities. It gives us better buying power"	"The DFT funding has come in useful to cover maintenance issues, we didn't know where we were going to source it from. Opportunities like this should be more viable"
Programming Techniques	"Imtrac is a great tool to use to manage assets. Authorities that use it get the benefit but those that haven't are <u>losing</u> out"	"We prioritise through a spreadsheet based on scores calculated on condition and equipment type, this is all done manually"	"Anything over 15 years old is replaced, our target objective is 90%, currently 84% is under this age, so we're slightly behind our target"	"We are currently forecasting a <u>70 year</u> asset replacement programme"

Analysis of research Innovation

Innovation Support	"If we don't innovate, we will be left behind with existing technology and it would be difficult to meet government laws and legislations."	"We have started with smaller innovative trials before rolling out"	"We're, ignored by SLT. An annual performance report is created to identify team objectives to highlight achievements. No feedback has been received, showing lack of SLT support."	"Trying to show SLT issues we're facing is difficult. We don't have any support from leaders, but we're planning for the future. It's changing but it's a slow process."
Policies	"Procurement rules limit what we can do with innovation."	"Our policy has changed, its not like for like anymore, all has to be upgraded and innovation included."	"Trying to get new international players to the market. Which shakes up the UK industry. Factory tours across Europe to see how we can bring that standard to the UK".	"Suppliers have been previously defeated coming to the UK, we will support them to be able to sell products with things like Topas approval."
Specific resources	"Innovation team get grant funding and upgrade signal to improve them and cover the maintenance gaps. Helps prioritise a programme."	"We have a specific innovation team, sometimes we share information and sometimes we don't. We're not a research institutions"	"We have resource for innovation, me and 1 other, which is funded through innovation bids."	"Authorities need to be careful having specific resource for innovation, it wouldn't work everywhere. We need industry leaders and then others can learn from their experiences"

Analysis of research Competitive Advantage

Resource	"Turnover of Staff is the biggest issue for the public sector due to staff leaving to go to the private sector."	"When we finally get the funding for projects, the lack of resource then becomes apparent delivering extra workload with the same resource."	"I love my role but the volume of work is killing me"	"I enjoy my role; I have been there a long time and I've considered moving to consultants, but I prefer the way the council delivers projects"
Skills	"I have a concern for staff retention, there needs to be staff progression due to skills shortage and external opportunities available."	"Recruiting the skills in because we haven't historically had the skills in house, it's difficult to recruit the skill set needed."	The PFI contract may come back in house, although due to the size of it, we don't have the skills to effectively manage it.	"Skills strain, related to revenue budget means more work for us as a consultant. Authorities don't have the skill set or resource availability."
Training	"Training comes down to time due to lack of resource and no training budget. We can attend free events."	"We've helped training with neighbouring authorities to ensure cross border working is effective. Not enough experts in the industry and by helping each other is a benefit"	"Training is strongly encouraged within our authority. I help deliver IHE training, and have access to course material, which I can deliver to my team free of charge"	"Within my innovation role it is essential I attend training. I also present our findings to educate the industry."