

# An evaluation of training courses and programmes in various management level job categories for road transport: A quantitative data analysis

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**Abstract.** Training programmes for road transport jobs and positions vary significantly across Europe and worldwide. The training programmes are highly developed and specialised in some countries, being strategically managed at a national level, whilst in many countries, training in particular for lower-skilled positions, is mostly organised and managed in-house by companies, and just a few national formal training schemes are available. Therefore, it is necessary to identify potential gaps in the availability of training schemes and programmes in the road transport sector, to support further development of new programmes or the improvement of existing ones. This paper is centered on the analysis of existing training programmes and schemes for road transport primarily in Europe, but additionally Australia is also added in the study. A data set has been collected and statistically analysed for a number of countries. Different job categories in road transport have been studied. A comparison of results is presented showing a vast diversity and lack of standard in skills development for road transport. The study did not identify any evidence for any harmonised procedure and best practices in skills development for road transport amongst the countries under study. Instead, it appears that each country has developed and implemented training programmes and courses for a specific audience, targeting a specific learning outcome.

**Keywords:** Training, programmes, road transport, skills, data collection, analysis, careers.

## INTRODUCTION

Over the last decade, there has been a growing tendency towards internationalization of qualifications and knowledge transfer in Europe. The role of education in equipping graduates with the knowledge and competences they need to succeed in their careers has been reinstated. Many occupations are changing due to digitalisation and computer based high tech developments. Hence, higher education institutions (HEIs) and training providers are currently under pressure revising their training programmes and bespoke courses (EU, 2012; Council, E. U. , 2015).

The transport sector is a beneficiary and user of new computer based and digital technologies. The future of the transport sector will certainly require advanced skills in vehicle and infrastructure engineering, ICT and back office operations. The future transport sector will need professional expertise from every domain to continue providing a reliable service for passenger and freight (Council, E. U. , 2011; Christidis *et al.*, 2014).

Every transport mode is characterised by different features. Although there is a visible progress with autonomous vehicles, the road transport will still remain

100% dependent on the services of skilled and motivated drivers in near future (Philipp, 2014). It is estimated that the professional drivers will undergo changes. In the long-term horizon drivers as we know them, will probably disappear. This is just an example of what is going to happen with transport in the future. Next generation drivers and automated vehicle operators will emerge and replace the professional drivers as we know them (SKILLFUL, 2017).

Autonomous and unmanned transport systems, drones, hyperloop tubes and robot- drivers require all new set of skills and competences. To what extent are the current practices in skills development for road transport providing the new skills and competences required?

The scope of this research is to critically review the current practices in skills development for the needs of road transport mode in the EU and beyond, in order to gain a better understanding of existing training schemes, and specific programmes and courses, their content and targeted audience, as well as the training providers and/or programme owners. Therefore, the objectives of this study is to:

- i. Identify the current training requirements across Europe and worldwide in relation to different careers relating to road transport;
- ii. Assess gaps that currently exist in training for road transport careers, through interviews with stakeholders and a workshops;
- iii. Map any harmonised procedures and/or current best practices, if any, to gaps in order to identify future training requirements.

## METHODOLOGY

The methodology comprises three distinct steps and subsequent activities:

- Data collection;
- Categorisation of data and setup of analysis templates;
- Data processing and analysis.

The proposed methodology and further research work focused on all types of careers: professional, blue-collar workers, white-collar workers, engineers, researchers and management. Therefore, it was a major challenge to collect such diverse information from different countries.

### Data collection

To ensure the best coverage of the topic, the methodology considered multiple sources of information that were further used for data collection. The data sources consist of:

1. Consultation of experts in a large number of European

countries and in some non-European countries; both experts in the field of road transport and education were considered;

2. Extensive review of recent relevant scientific literature;

Comprehensive data sets were gathered and analysed for 16 countries: Australia, Belgium, Bulgaria, China, Germany, Greece, Ireland, Italy, The Netherlands, Poland, Portugal, Romania, Slovakia, Spain, Sweden and the UK.

However, due to inherent difficulties and to the different public availability of the relevant data, it was not possible to gather all the necessary details for all of the considered countries, and therefore, the data sets are not perfectly similar and harmonised. Due to this issue, assumptions and adjustments of data had to be made.

### Categorisation and setup of the template

The data sets were collected through templates and surveys specifically designed to collect information on existing training schemes and programmes/courses for road transport in targeted countries. The templates used the three management levels for transport planning and operations, namely: strategic, tactical and operational (Marinov *et al.*, 2013). This approach was originally developed for the rail sector but is applicable to road transport, as well. The management levels are briefly explained:

- **Strategic** includes long term planning of company development. Decisions made at this level set the strategic goals of the company, which include assessment resources, strategic changes in the company structure, redesign and reconstruction of infrastructure, relocation of assets, construction of new roads and motorways, acquisition of new resources and technologies, etc. This is the highest level of management in road organisations.

- **Tactical** includes medium term planning. At this level, all the planning, timetables and schedules are developed. As stated by Crainic and Laporte (1997, p. 411), tactical planning is “to ensure, over a medium term horizon, an efficient and rational allocation of existing resources in order to improve the performance of the whole system”. At this level, capacity research analysis of congestion and performance assessment are conducted.

- **Operational** includes short term planning, which might be executed over the same day of service delivery. At this management level, the plans, timetables and schedules are implemented on a “day-to-day” basis in order for the system to provide the service effectively.

The template spreadsheets include the categories and subcategories that correspond to the road transport

**Table 1.** Categories of template, corresponding to the road transport career matrix templates.

Job groups	Management levels		
	Strategic	Tactical	Operational
Vehicles and Equipment Development			
Infrastructure			
Transport of Persons - Public Transport			
Transport of Persons - Private Transport			
Freight Transport and Logistics			
Transportation Law and Law Enforcement			
Safety and Security			
Parking			
Tolling/Pricing			
Service to Persons			
Academia/Research			

**Table 2.** Subcategories of the template's 7 job group categories.

Vehicles & Equipment Development
College
University
Professional training
Apprenticeships
VET & CVET
Other

career matrix.

The data is distributed amongst the above mentioned three Management Levels, seven job groups as shown in Table 1. Furthermore, each job group includes six subcategories, i.e., six Fields of Education. The same fields of education were considered for each job group; an example, for the randomly chosen “Vehicles and Equipment Development” group, is shown in Table 2.

**Data processing**

The data was processed by merging all of the available Excel Spreadsheets from different countries into an integrated working spreadsheet. This spreadsheet allowed filtering of the data by 3 main criteria, namely “Country”, “Field of Education”, and “Job Group”. The filtering option made the data a lot easier to handle for the analyses and for creating graphical representations, and made it much easier to select specific countries, jobs, or education levels required.

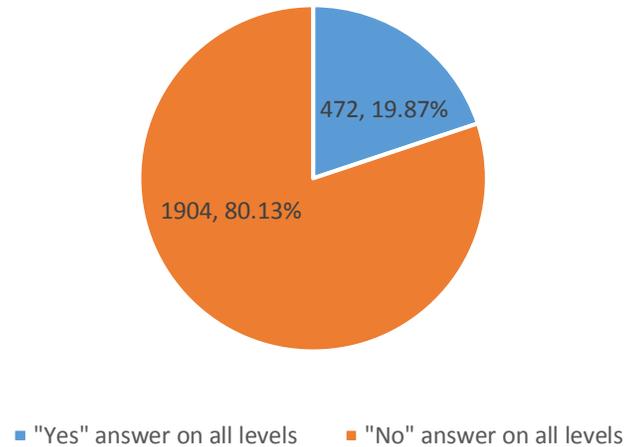
Before merging the data, each spreadsheet for each country was thoroughly examined for any inconsistencies in the categorisation groups, and was checked to ensure that it follows the setup explained above. In cases where there were different job groups to the standard ones in the setup, an attempt was made to classify these job groups into one or more of the standard ones. If the job

group was entirely different, it was simply discarded, as none of the other countries would have that job group, and thus it would be meaningless for comparison purposes. Furthermore, if any of the standard job groups were missing from a particular country, a “No” answer was simply assumed for all of the options of that job groups. This assumption obviously was very likely to affect the reliability and the correctness of the data and, therefore, the analyses carried out further.

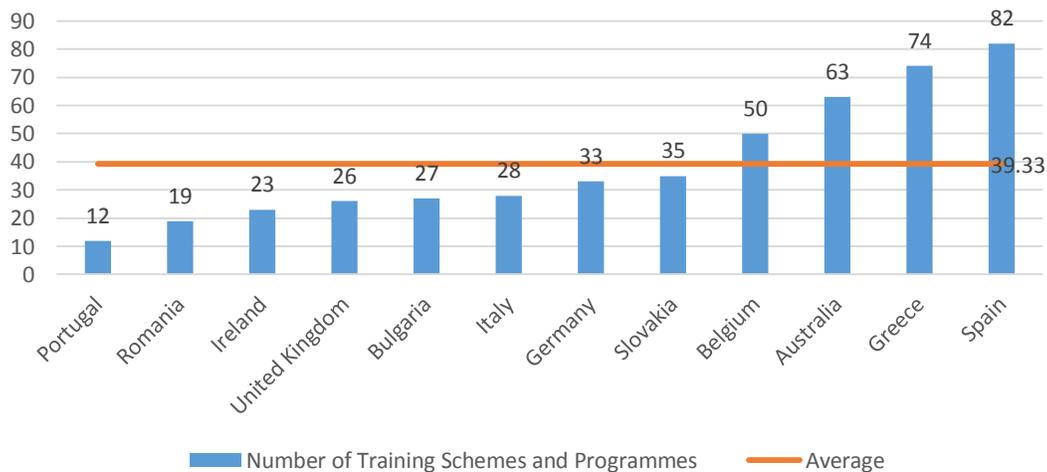
Another major issue when processing the data was the fact that a great amount of the data (nearly half) was missing. This issue occurred in three different ways:

- A whole job group was simply missing from the country’s spreadsheet;
- The job group was present, but there were no answers provided for any of its fields;
- The job group was present, but answers were provided only for some of its fields.

For all these situations, any missing data was changed to a “No” answer. This assumption was made as, technically, omission of data means there were no such training schemes or programmes, and thus the answer for the relevant field would be “No”. However, it is very likely that in many cases the gaps were due to the quality of data collection exercise and difficulties in finding the right information, rather than to the non-existence of



**Figure 1.** Number of all training schemes and programmes.



**Figure 2.** Number of training schemes and programmes by countries.

those categories.

The data amendment due to this assumption, combined with the discrepancies in the job categorisations described previously, reduces the reliability of this study, its analyses and findings.

## DATA ANALYSIS

### Distribution in all categories and management levels

#### *Distribution on all levels*

Figure 1 shows the total number of training schemes and programmes in all countries combined. 19.87% of all of the options have a "Yes" answer. Thus, there is an average of 19.87% of all of the possible training schemes and programmes provided in each country. This shows that most of the possible options were provided with a negative answer and that overall, a low number of these

training schemes and programmed are widely available.

#### ***Distribution amongst countries***

Figure 2 shows the numbers and distribution of training schemes and programmes, in different countries, in all fields combined. The orange line represents the average across all countries, which stands at 39.33.

Spain is the country with the most training schemes and programmes, with a total of 82 "Yes" answers; while the country with the least of such schemes is Portugal, with less than a sixth of Spain's total, with only 12 "Yes" answers.

Figure 3 represents the same data, but with percentages of positive answers instead of the raw figures.

Figure 4 shows the average of training schemes and programmes split amongst the 3 management levels. It can be observed in Figure 4 that the "Operational"

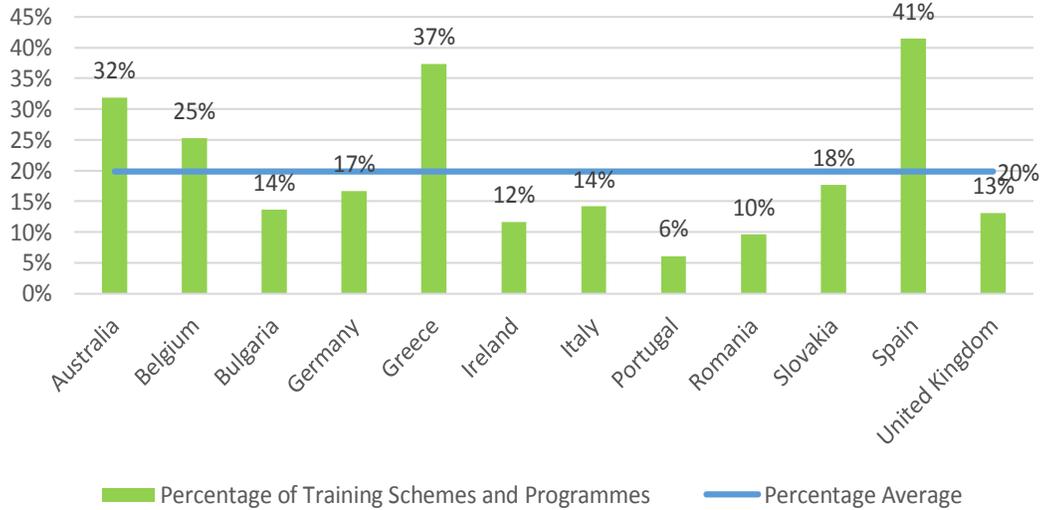


Figure 3. Percentage of training schemes and programmes by countries.



Figure 4. Percentage of "Yes" responses by management levels.

management level has the most training schemes and programmes out of the possible courses, with 22.73% "Yes" answers.

Meanwhile, the "Strategic" and "Tactical" levels are below the overall average of 19.87% and the lowest is "Tactical", standing at only 18.06% "Yes" answers.

Figure 5 displays the number of training schemes and programmes on the management level "Strategic", split up by country.

Spain is the country with the most such courses, with 27 "Yes" answers, while the country with the fewest schemes is Portugal with only 5 "Yes" answers. The blue line represents the average training schemes across all countries, within the "Strategic" management level, standing at 12.42.

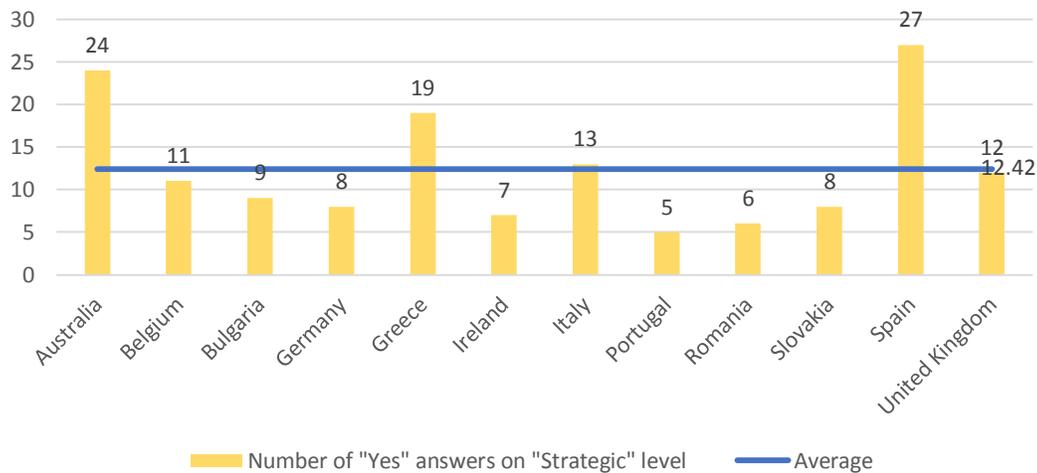
Figure 6 displays the number of training schemes and

programmes on the management level "Tactical", split up by country.

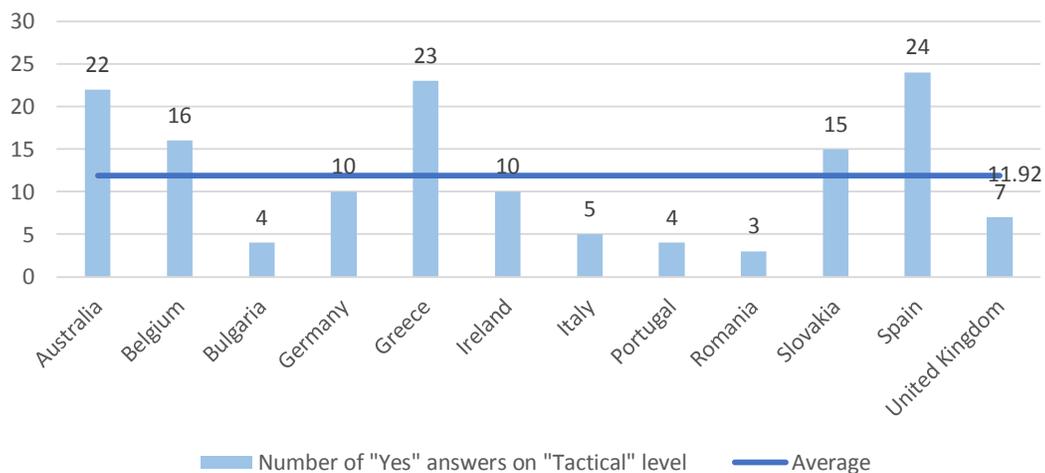
Spain is the country with the most such courses, with 24 "Yes" answers, while the country with the fewest schemes is Romania with only 3 "Yes" answers. The blue line represents the average training schemes across all countries, within the "Tactical" management level, standing at 11.92.

Figure 7 displays the number of training schemes and programmes on the management level "Operational", split up by country.

Greece is the country with the most such courses, with 32 "Yes" answers, while the country with the fewest schemes is Portugal with only 3 "Yes" answers. The blue line represents the average training schemes across all countries, within the "Operational" management level,



**Figure 5.** Number of "Yes" responses in the "Strategic" management level by countries.



**Figure 6.** Number of "Yes" responses in the "Tactical" management level by countries.

standing at 15.00.

### ***Distribution amongst fields of education***

Figure 8 represents the distribution of all training schemes and programmes, split up and categorised by their education level.

This chart shows that the "University" field of education contains the most training schemes and programmes, with a total of 33%. This category is followed by the field of education "Professional Training", with only 25%, and closely after it is "VET & CVET" (17%).

Then, 15% of the schemes are provided by the "College" field of education, 11% by "Apprenticeships", and the lowest percentage belongs to the "Other" category, with only 7%.

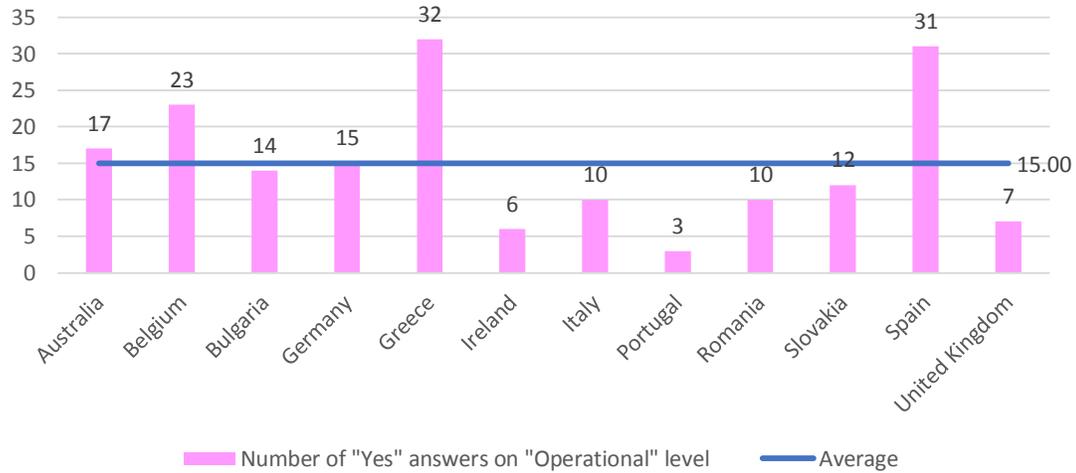
Figure 9 displays how the training schemes and

programmes are spread across within both each management level, and all the fields of education.

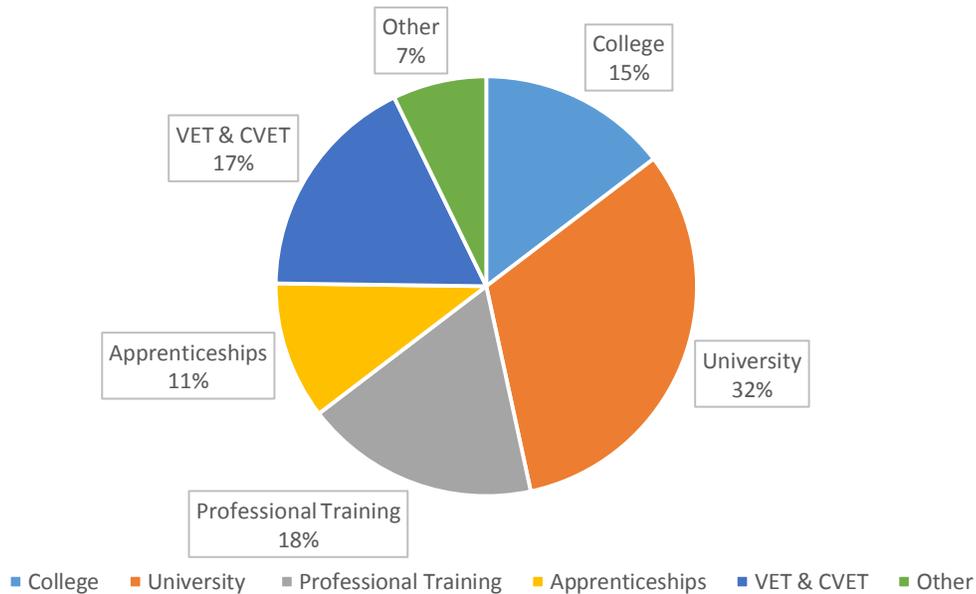
To aid comparison of the management distribution and the overall distribution amongst all fields of education, the overall data is represented again in Figure 10.

The following conclusions can be drawn upon comparison of the overall distribution, in Figures 8 and 10, and the management levels distribution, in Figure 9:

- In the "Strategic" management level, most training schemes and programmes are provided by "University" and "Professional Training". The fields of education which contain the least courses are "Apprenticeships" and "Other".
- In the "Tactical" management level, most training schemes and programmes are provided by "University" or "VET & CVET". The fields of education which contain the least courses are "Apprenticeships", "Professional



**Figure 7.** Number of “Yes” responses in the “Operational” management level by countries.



**Figure 8.** Distribution of training schemes and programmes amongst fields of education.

Training” and “Other”.

- In the “Operational” management level, most training schemes and programmes are provided by “University” or “VET & CVET”. The fields of education which contain the least courses are “Apprenticeships” and “Other”.

In order to compare the distributions well, it is essential to consider the overall distribution amongst the management levels here, as visible in Figure 11:

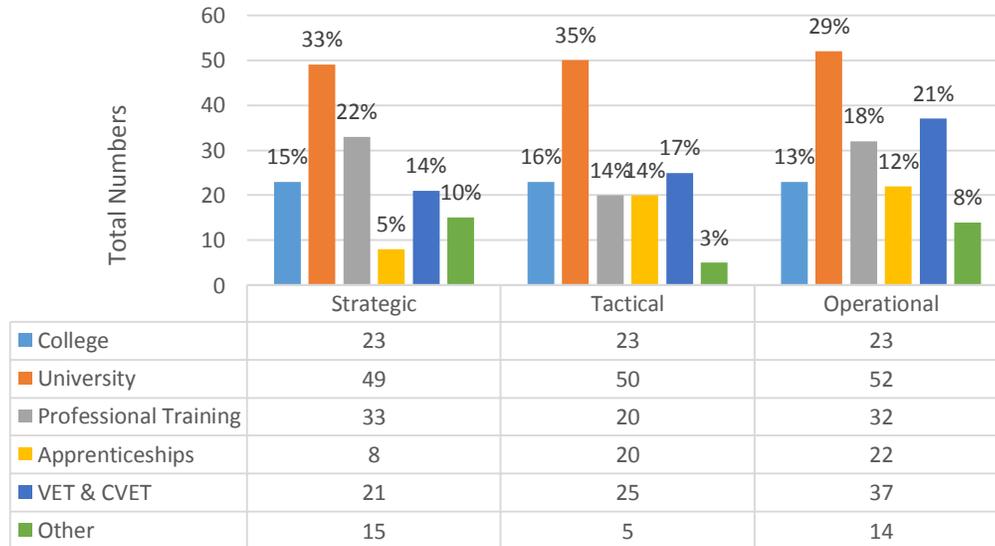
- The “Strategic” level contains 32% of all training schemes and programmes.
- The “Tactical” level contains 30% of all training schemes and programmes.

- The “Operational” level contains 38% of all training schemes and programmes.

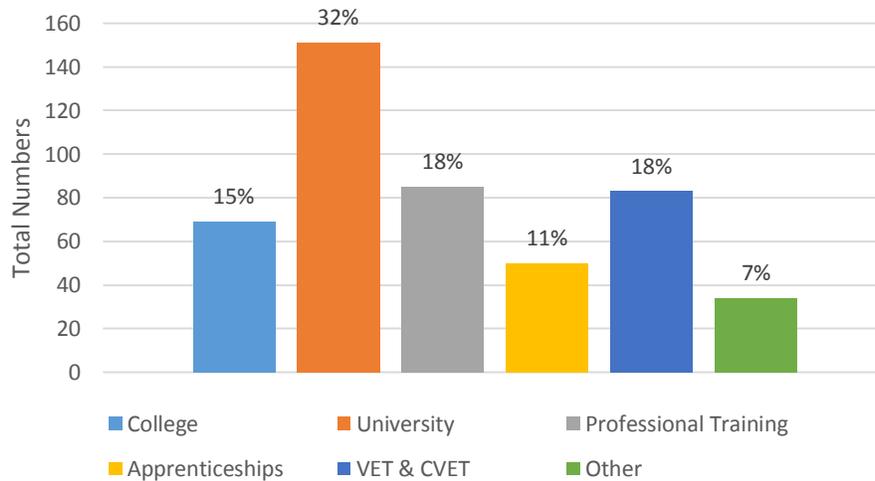
Furthermore, upon examining the distribution in each field of education in percentage, as visible in Figure 9, the distribution amongst the management levels within each certain field of education can be compared with the overall distribution amongst all of the fields.

After further investigation of this data, the following conclusions can be made regarding the differences in distributions:

- In the “College” field of education, there is an equal distribution across all three of the management levels,



**Figure 9.** Distribution of categories of training schemes and programmes within each management level.



**Figure 10.** Distribution of training schemes and programmes amongst fields of education.

and they all contain exactly 23 courses.

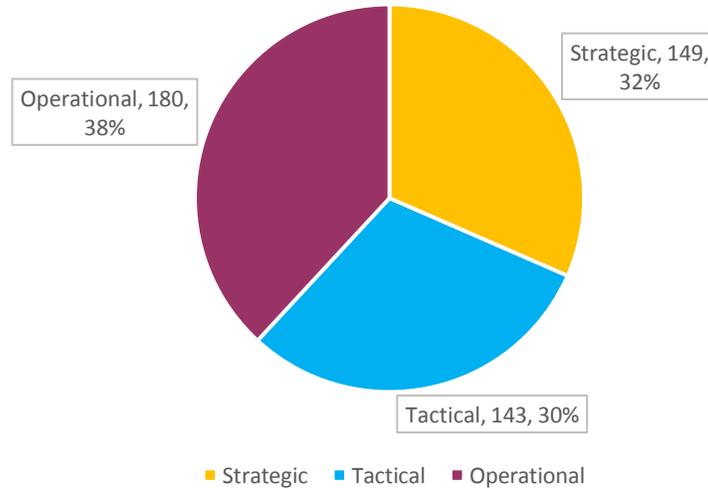
- In the “University” field of education, most training schemes and programmes are in the “Operational” management level, namely 52 courses. However, the difference with the other two management levels is practically negligible, as “Tactical” has 50 courses and “Strategic” has 49.
- In the “Professional Training” field of education, most of the courses are within “Strategic”, with 33, and “Operational”, with 32. Meanwhile, there are considerably less in the “Tactical” management level, with only 20 courses.
- In the “Apprenticeships” field of education, most of the courses are within “Operational”, with 22, and “Tactical”, with 20. Meanwhile, there are considerably less in the

“Strategic” management level, with a mere 8 courses.

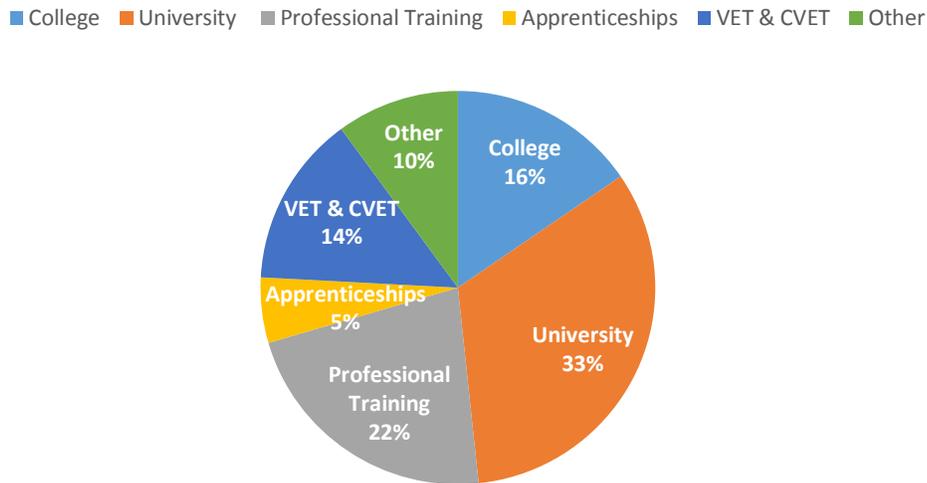
- In the “VET & CVET” field of education, the “Operational” management level contains the most courses, with 37. Meanwhile “Tactical”, with 25, and “Strategic”, with only 21, contain significantly less training schemes and programmes.
- In the “Other” field of education, most of the courses are within “Strategic”, with 15, and “Operational”, with 14. Meanwhile, there are significantly less in the “Tactical” management level, with only 5 courses.

**Distribution within management levels**

Figure 11 shows that the “Operational” management level



**Figure 11.** Distribution of training schemes and programmes amongst management levels.



**Figure 12.** Distribution of training schemes and programmes within the management level "strategic".

contains the most training schemes and programmes, with 180 “Yes” answers, representing 38% of the total; while “Tactical” contains the least, with only 143 “Yes” answers, which is 30% of the total. The “Strategic” level is slightly above “Tactical”, with 149 “Yes” answers, namely 32% of the total.

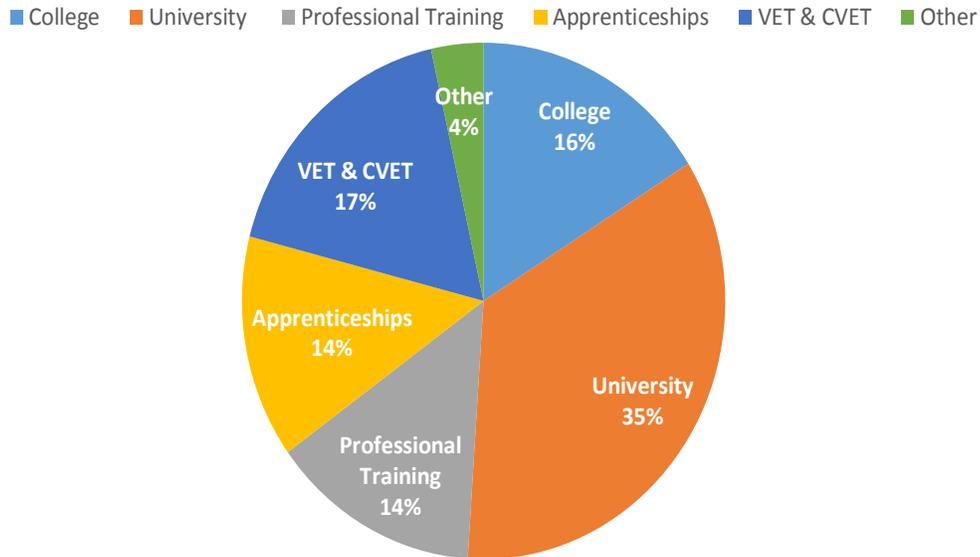
Despite these small differences, the distribution of the courses amongst the management levels is visibly fairly even. Within the “Strategic” management level, 33% of training schemes and programmes are in the “University” field of education, with a further 22% being within “Professional Training” (Figure 12). Thus, more than half of the courses are within the “University” and “Professional Training” categories alone.

This leaves the remaining 4 categories with only 45% of the courses distributed amongst them. The fewest

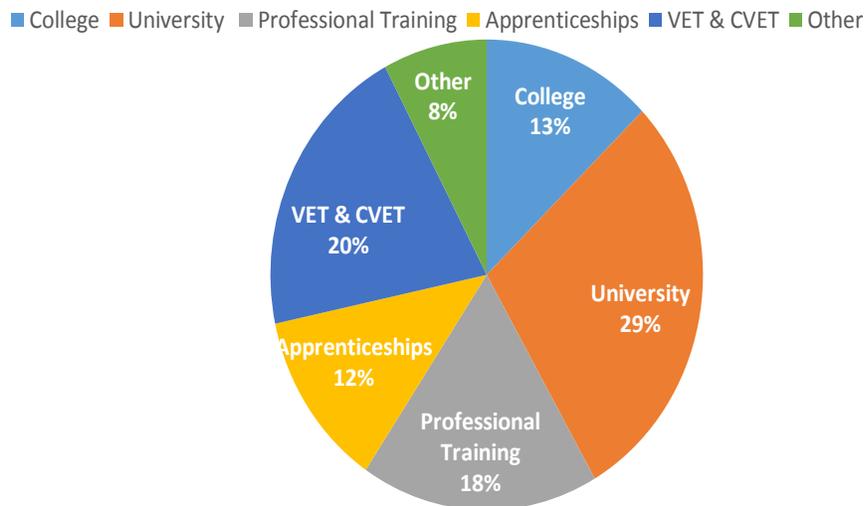
courses are in the “Other” (with 10%), and the “Apprenticeships” (with 5%) categories.

Within the “Tactical” management level, 35% of training schemes and programmes are in the “University” field of education, with a further 17% being within “VET & CVET” (Figure 13). Thus, more than half of the courses are within the “University” and “VET & CVET” categories alone. This leaves the remaining 4 categories with only 48% of the courses distributed amongst them. The fewest courses are in the “Apprenticeships” (with 10%), “Professional Training” (with 14%) and the “Other” (with only 4%) categories.

Within the “Operational” management level, 29% of training schemes and programmes are in the “University” field of education, with a further 20% being within “VET &



**Figure 13.** Distribution of training schemes and programmes within the management level "tactical".



**Figure 14.** Distribution of training schemes and programmes within the management level "operational".

CVET" (Figure 14). Thus, nearly half of the courses are within the "University" and "VET & CVET" categories. The fewest courses are in the "Apprenticeships" (with 12%), and the "Other" (with only 8%) categories.

The chart in Figure 15 shows the distribution of the training schemes and programmes amongst the management levels, within each field of education separately. The chart shows the same data as Figure 9, but in Figure 15 the management levels are each shown within each field of education, whereas Figure 9 is the other way around, i.e., the split of fields of education is shown within each management level.

From this chart, the conclusions drawn in Section 3.2 could be expanded as follows:

- Within the "Strategic" management level, "University" and "Professional Training" provide the most training courses, with 49, and 33 "Yes" answers respectively. On the other hand, "Apprenticeships" and "Other" are the fields of education which contain the least courses, with only 15, and 8 "Yes" answers respectively.
- Within the "Tactical" management level, "University" and "VET & CVET" provide the most training courses, with 50, and 25 "Yes" answers respectively. On the other hand, "Apprenticeships", "Professional Training" and "Other" are the fields of education which contain the least courses, with only 20, 20 and 8 "Yes" answers respectively.
- Within the "Operational" management level, "University" and "VET & CVET" provide the most training courses,

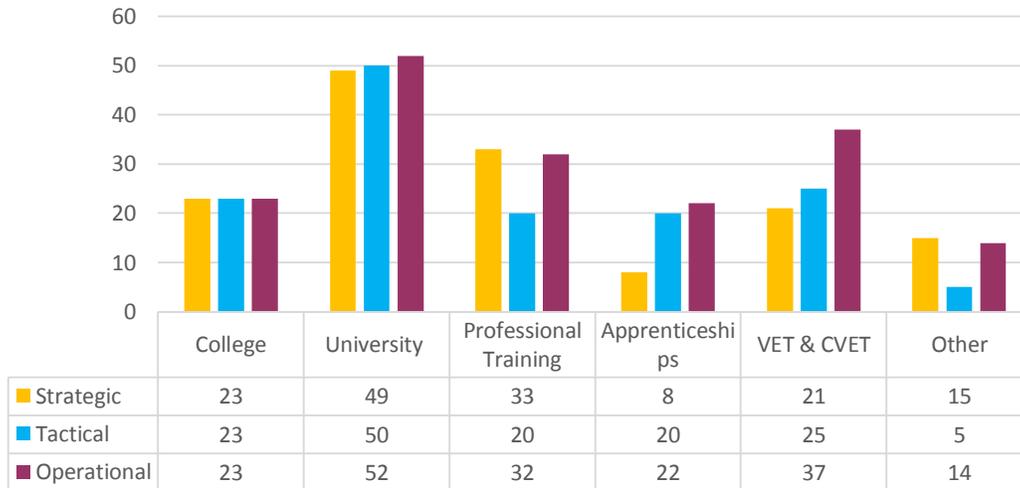


Figure 15. Distribution of management levels within fields of education.

with 52, and 37 “Yes” answers respectively. On the other hand, “Apprenticeships” and “Other” are the fields of education which contain the least courses, with only 22, and 14 “Yes” answers respectively.

Figure 16 shows how the training schemes and programmes are distributed amongst the three management levels within each separate job group.

Only a few of the groups have an even spread amongst the management levels, namely “Academia/ Research”, with the greatest difference being 3%, “Transportation Law and Law Enforcement”, with the greatest difference being 5%, “Transport of Persons - Private Transport”, with the greatest difference being 9%, and lastly “Vehicles & Equipment Development”, with the greatest difference being 6%.

“Tactical” is the top management level in for only 3 job groups, namely “Service to Persons” (where it is joint first), “Safety & Security”, and “Transportation Law & Law Enforcement”. Thus, it is the top management level in each job group the least times. This result is not unexpected, as it has the smallest percentage of courses overall.

However, a slightly surprising result is the fact that the “Strategic” and “Operational” management levels are both the top management levels in 5 job groups, despite the fact that overall, “Operational” contains 31 more courses (6% out of the total) than “Strategic”. For one job group, namely “Parking”, these 2 management levels are also joint top.

Some of the job groups with a more extreme spread are “Safety & Security”, where 52% of courses are on the “Tactical” management level, but only 4% are on the “Operational” level; and “Freight Transport & Logistics”, where the “Operational” level makes up 53% of courses, which is the highest percentage that any management level takes up of a group.

### Distribution amongst job groups

Figure 17 shows the distribution of training schemes and programmes amongst the job groups. The “Infrastructure” job group contains the most training schemes and programmes, with 76 “Yes” answers, making up 16% of the total. It is closely followed by “Transport of Persons - Public Transport”, with 72 “Yes” answers, and “Vehicles & Equipment Development”, with 62, making up 15 and 13%, respectively of the total.

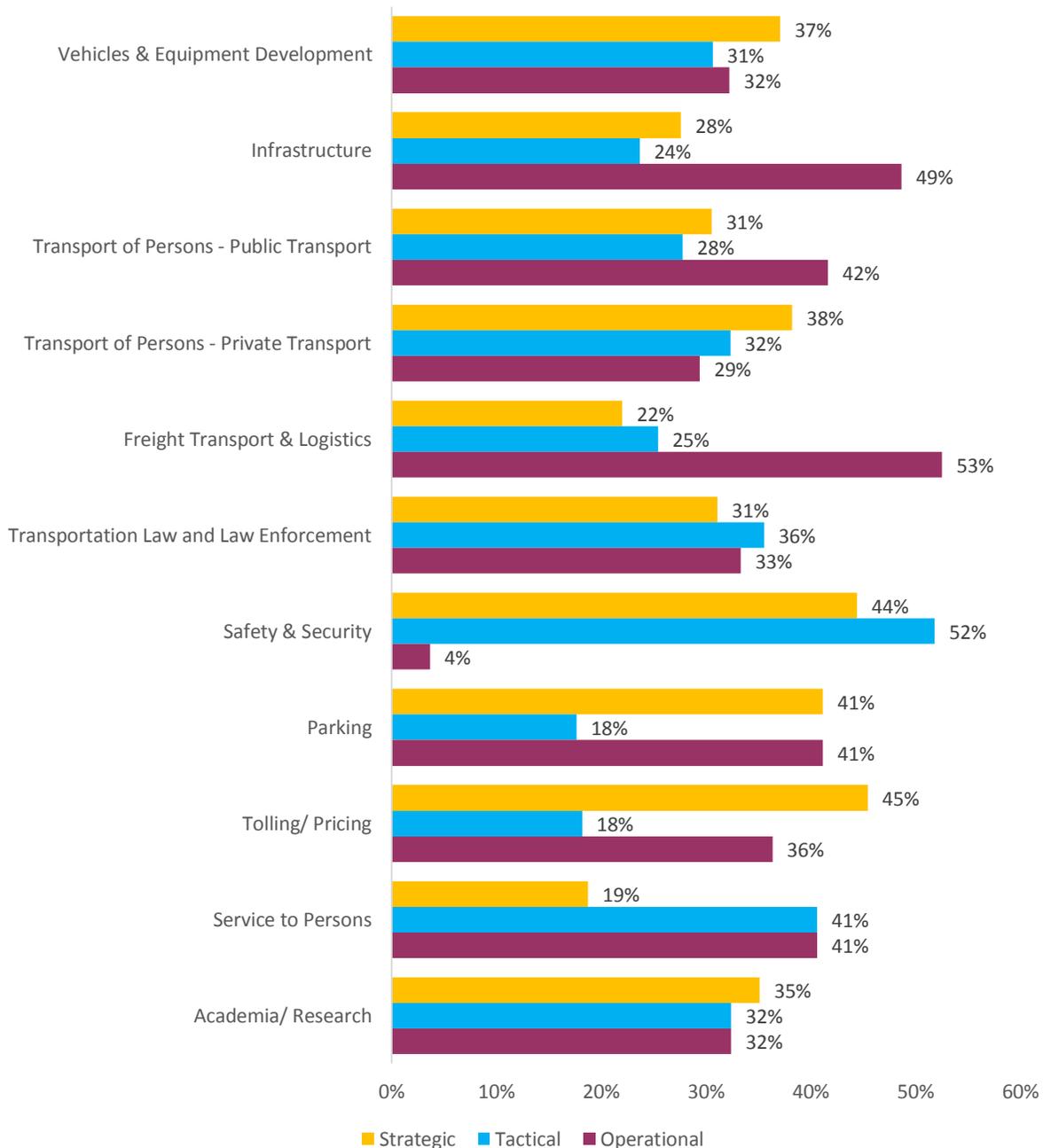
The “Parking” job group provides the least courses, with a mere 11 “Yes” answers, making up only 2% of the total. It is closely followed by “Parking”, which makes up 4% of the total number of training schemes and programmes, with only 17 courses.

The distribution amongst the top 5 job groups seems to be quite even, as they range from “Infrastructure”, the highest, with 16% all the way to “Transportation Law and Law Enforcement”, with 10%. Thus the top 5 job groups are all within 6% of each other, making up around 2/3 of all courses.

Similarly, the bottom 6, i.e. the rest of the job groups, have quite a small spread in their range, with “Tolling/ Pricing”, the lowest, at 2%, all the way to “Safety & Security”, at 8%. Thus the bottom 6 job groups are all within 6% of each other, making up only 1/3 of all of the courses.

### Job group “Vehicles and Equipment Development”

Figure 18 shows that the distribution of training schemes and programmes amongst management levels within the “Vehicles & Equipment Development” job group is almost perfectly even, as the top and bottom management levels only have a difference of 6.45% between each other. “Strategic” is the top management level, with 23 courses,



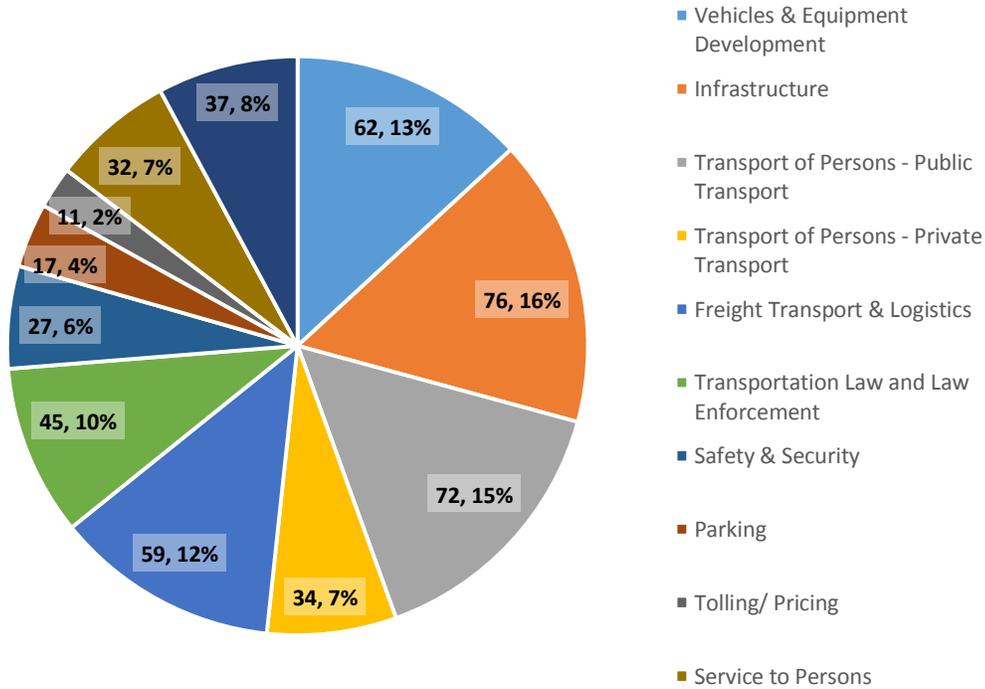
**Figure 16.** Distribution of management levels within job groups.

making up 37.10% of the total courses provided. Next is “Operational” with 20 courses, making up 32.26%, and lastly is the “Tactical” level, with 19 courses, making up 30.65% of the total.

Upon further analysis of Figure 19, it can be observed that in the “Vehicles & Equipment Development” job group, “University” is the education level with the most courses, with a total of 20 courses, followed by “Apprenticeships”, with 12. Meanwhile, the other education levels all have 10 courses, except “Other”, which has 0.

Furthermore, the following deductions can be made regarding the distribution of the data:

- In the “College” field of education, there is quite an even distribution across all three of the management levels, as “Strategic” contains 4 courses, and “Tactical” and “Operational” both contain only 1 less, having 3 courses.
- In the “University” field of education, the “Strategic” management level has the most training schemes and programmes, namely 8 courses. However, “Operational” has only 1 less, having 7. “Tactical” has the least



**Figure 17.** Distribution of training schemes and programmes amongst job groups.



**Figure 18.** Distribution of training schemes and programmes amongst management levels in the job group "Vehicles & Equipment Development".

courses, with merely 5.

- The "Professional Training" field of education, has exactly the same distribution as in "College".

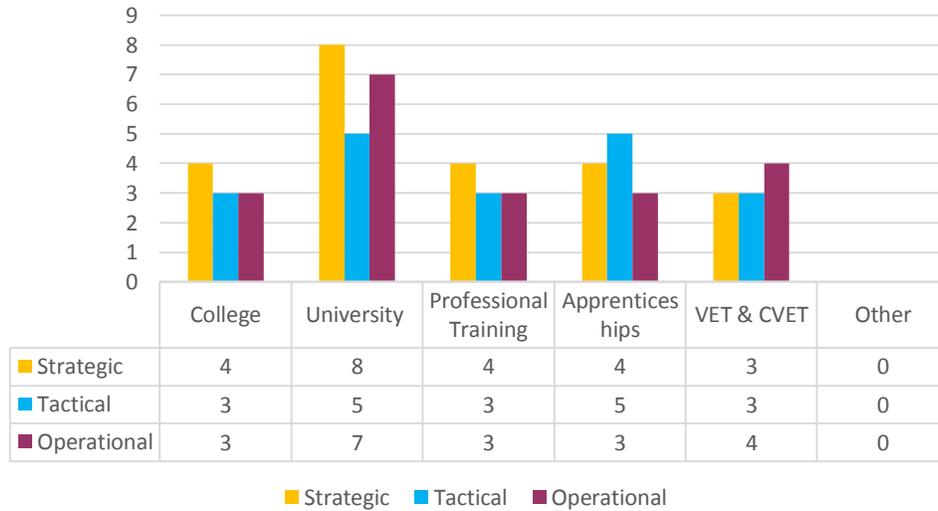
- In the "Apprenticeships" field of education, most of the courses are within "Tactical", with 5. This is closely followed by "Strategic" with 4, and "Operational" with 3.

- In the "VET & CVET" field of education, the "Operational" management level contains the most courses, with 4. Meanwhile "Tactical" and "Strategic", both contain 1 less, with only 3 courses.

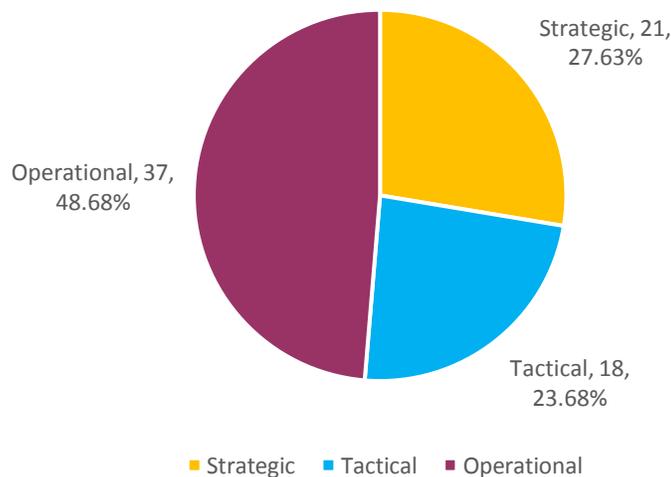
- There are no courses in the "Other" category.

**Job group "Infrastructure"**

Figure 20 shows that the distribution of training schemes and programmes amongst management levels within the "Infrastructure" job group is quite uneven, as "Operational" makes up around half of the courses. The



**Figure 19.** Distribution of training schemes and programmes amongst fields of education in the job group “Vehicles & Equipment Development”.



**Figure 20.** Distribution of training schemes and programmes amongst management levels in the job group “Infrastructure”.

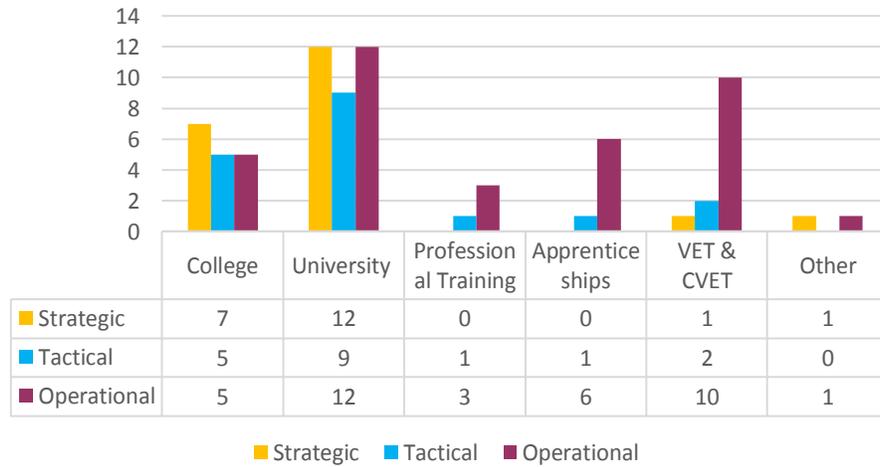
other two management have the remaining courses spread between them fairly evenly.

“Operational” is the top management level, with 37 courses, making up nearly half (48.68%) of the total courses provided. The remaining half is evenly spread amongst “Strategic”, with 21 courses, and “Tactical”, with only 18, making up 27.63%, and 23.68% of the total respectively.

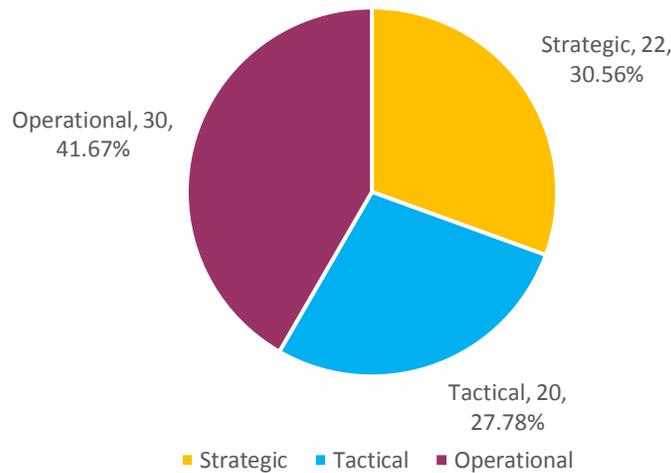
From Figure 21, it can be observed that in the “Infrastructure” job group, “University” is the education level with the most courses, with a total of 23 courses, followed by “College”, with 17. Meanwhile, “Professional Training” which has only 4 courses, and “Other”, with only 2, are the smallest categories.

Furthermore, the following deductions can be made regarding the distribution of the data:

- In the “College” field of education, there is a fairly an even distribution across all three of the management levels. “Strategic” contains the most courses, having 4. Meanwhile, both “Tactical” and “Operational” both contain only 2 less, having 5 courses.
- In the “University” field of education, the “Strategic” and “Operational” management level has the most training schemes and programmes, having 12 courses. “Operational” has 3 less than the other two groups, thus having 9 courses.
- “Professional Training”, being the smallest group, has no courses at all at the “Strategic” level, only 1 at the “Tactical” level, and 3 for its largest management level, namely “Operational”.
- The “Apprenticeships” field of education has quite an



**Figure 21.** Distribution of training schemes and programmes amongst fields of education in the job group “Infrastructure”.



**Figure 22.** Distribution of training schemes and programmes amongst management levels in the job group “Transport of Persons - Public Transport”.

unbalanced distribution, as it offers no courses at the “Strategic” level and only 1 at the “Tactical” level. However, it offers 6 at the “Operational” level.

- In the “VET & CVET” field of education, the distribution is very uneven, as the “Operational” management level contains the most courses, with 10. Meanwhile “Tactical” contains only 2, and “Strategic” contains only 1.
- There are 2 “Other” courses offered, one at the “Strategic” level, and one at “Operational”.

**Job group “Transport of Persons - Public Transport”**

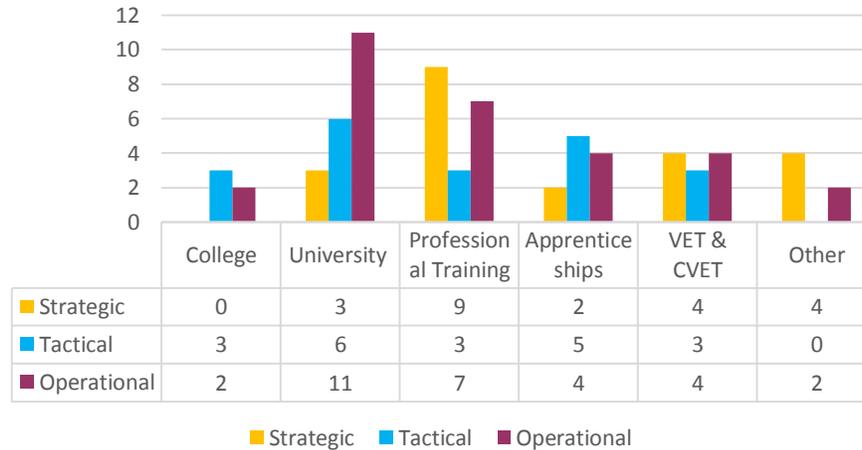
Figure 22 shows that the distribution of training schemes and programmes amongst management levels within the “Transport of Persons - Public Transport” job group is

somewhat even, as the top and bottom management levels have a difference of 13.89% between each other.

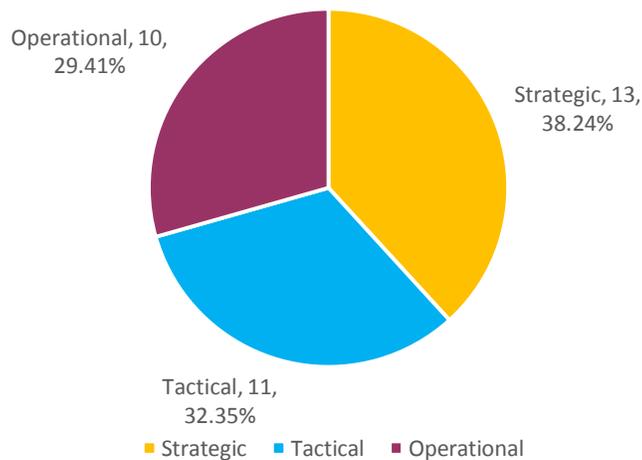
“Operational” is the top management level, with 30 courses, making up 41.67% of the total courses provided. Next is “Strategic” with 22 courses, making up 30.56%; closely followed by the “Tactical” level, with 20 courses, making up 27.78% of the total.

When looking at Figure 23, it can be observed that in the “Transport of Persons - Public Transport” job group, “University” is the education level with the most courses, with a total of 20 courses, followed by “Professional Training”, with 19. Meanwhile, “College” which has only 5 courses, and “Other”, with only 6, are the smallest categories.

Furthermore, the following deductions can be made regarding the distribution of the data:



**Figure 23.** Distribution of training schemes and programmes amongst fields of education in the job group “Transport of Persons - Public Transport”.



**Figure 24.** Distribution of training schemes and programmes amongst management levels in the job group “Transport of Persons - Private Transport”.

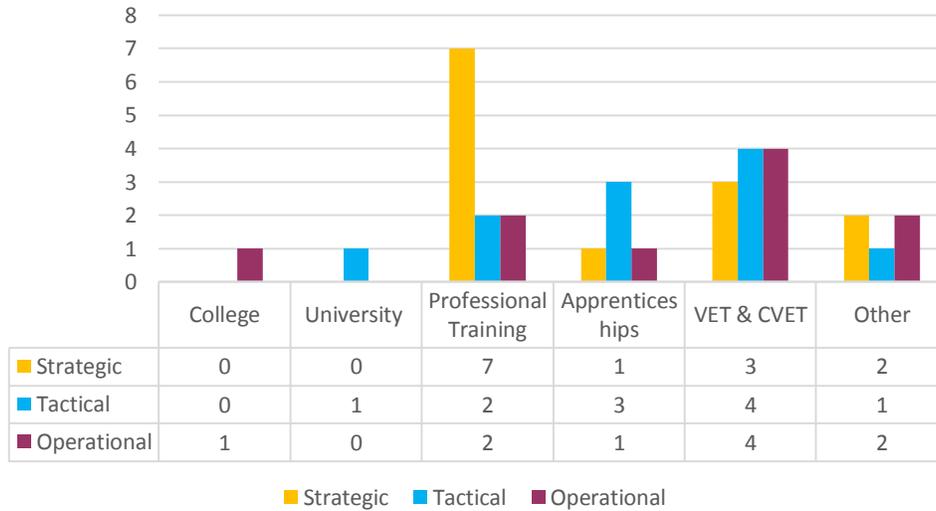
- Within the “College” field of education, there is a small number of total courses. There are no courses at the “Strategic” level. Meanwhile, “Tactical” has only 3 courses, and “Operational” only contains 2.
- In the “University” field of education, the “Operational” management level has the most training schemes and programmes, with a total of 11 courses. “Tactical” has nearly half of this, with only 6 courses, while “Strategic” has half the amount of courses in “Operational”, thus having 3 courses.
- “Professional Training”, has only 3 courses at the “Operational” level. However, the other two levels have considerably more courses, with “Operational” having 7 and “Strategic” having 9.
- The “Apprenticeships” field of education has only 2 courses at the “Strategic” level, but “Operational” has double this, with 4 courses. Furthermore, “Tactical” has

the most courses with 5.

- In the “VET & CVET” field of education, the distribution is quite even, as the “Strategic” and “Operational” management levels both contain 4 courses, and “Tactical” has only 1 less, with 3.
- There are 6 “Other” courses offered, 4 at the “Strategic” level, and 2 at “Operational”.

#### **Job group “Transport of Persons - Private Transport”**

Figure 24 shows that the distribution of training schemes and programmes amongst management levels within the “Transport of Persons - Private Transport” job group is quite even, as the top and bottom management levels have a difference of only 8.83% between each other. “Strategic” is the top management level, with 13 courses,



**Figure 25.** Distribution of training schemes and programmes amongst fields of education in the job group “Transport of Persons - Private Transport”.

making up 38.24% of the total courses provided. Closely after is “Tactical”, with 11 courses, making up 32.35%, and last is the “Operational” level, with 10 courses, making up 29.41% of the total.

Upon analysing Figure 23 above, it can be observed that in the “Transport of Persons - Private Transport” job group, “Professional Training” and “VET & CVET” are the education levels with the most courses, having a total of 11 courses each. Meanwhile, “College” and “University” are the smallest groups, both with only 1 course.

In addition, the following conclusions can be made regarding the distribution of the data:

- The “College” field of education has only 1 course overall, which is in the “Operational” management level.
- The “University” field of education has only 1 course overall, which is in the “Tactical” management level.
- “Professional Training” has quite an uneven distribution, as it has only 2 courses each at the “Operational” and “Tactical” levels. However, “Strategic” has considerably more courses, namely 9.
- The “Apprenticeships” field of education has 3 courses at the “Tactical” level, but “Operational” and “Strategic” only have 1 each.
- In the “VET & CVET” field of education, the distribution is quite even, as the “Tactical” and “Operational” management levels both contain 4 courses, and “Strategic” has only 1 less, with 3.
- There are 5 “Other” courses offered, 2 at the “Strategic” level, 1 at “Tactical”, and 2 at “Operational”.

**Job group “Freight Transport & Logistics”**

Figure 26 shows that the training schemes and programmes are not evenly spread amongst the three

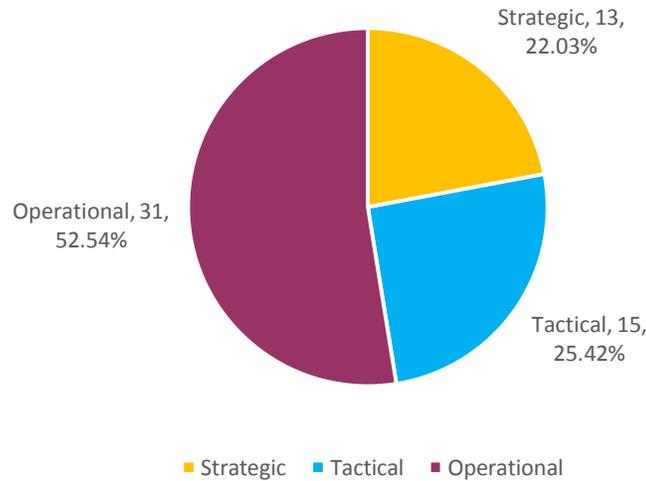
management levels within the “Freight Transport & Logistics” job group, as the top and bottom management levels have a great difference of 27.12% between each other, meaning that the top level, “Operational”, makes up more than half of the total of courses. The top management level also makes up more than double the amount of courses of either of the other two.

“Operational” is the top management level, with 31 courses, making up over half (52.54%) of the total courses provided. The remaining 47.46% is evenly spread amongst the other two management levels, namely “Tactical”, with 15 courses, making up 25.42%, and the “Strategic” level, with 13 courses, making up 22.03% of the total.

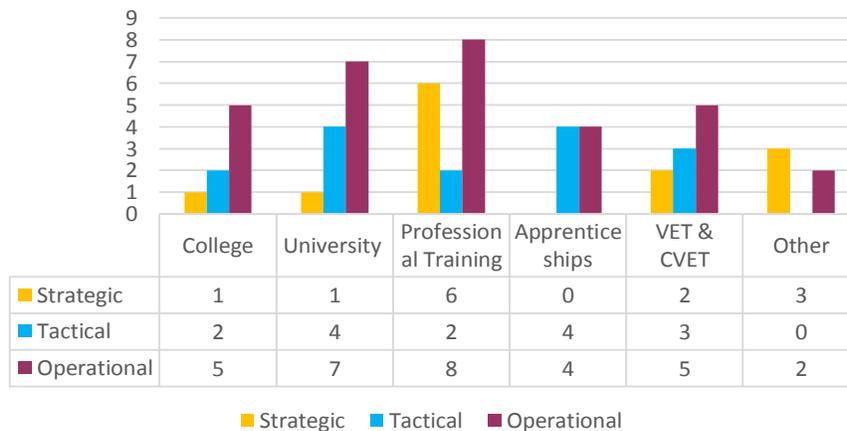
When further analysing Figure 27, it can be observed that in the “Freight Transport & Logistics” job group, “Professional Training” is the education level with the most courses, with a total of 16 courses, followed by “University”, with 12. Meanwhile, the smallest groups are “College” and “Apprenticeships”, which both have 8 courses, and “Other” which has only 5.

Furthermore, the following conclusions can be drawn regarding the distribution of the data:

- In the “College” field of education, there is quite an uneven distribution across all three of the management levels, as “Strategic” contains only 1 courses, and “Tactical” contains only 2, but “Operational” contains 5 courses.
- The “University” field of education also has an unbalanced distribution, as the “Operational” management level has the most training schemes and programmes, having 7 courses. However, “Tactical” has only 4, and “Operational” has merely 1.
- The “Professional Training” field of education, being the greatest group, has 8 courses in “Operational” and 6 in



**Figure 26.** Distribution of training schemes and programmes amongst management levels in the job group “Freight Transport & Logistics”.



**Figure 27.** Distribution of training schemes and programmes amongst fields of education in the job group “Freight Transport & Logistics”.

“Strategic”. However, “Tactical” has only 2 courses.

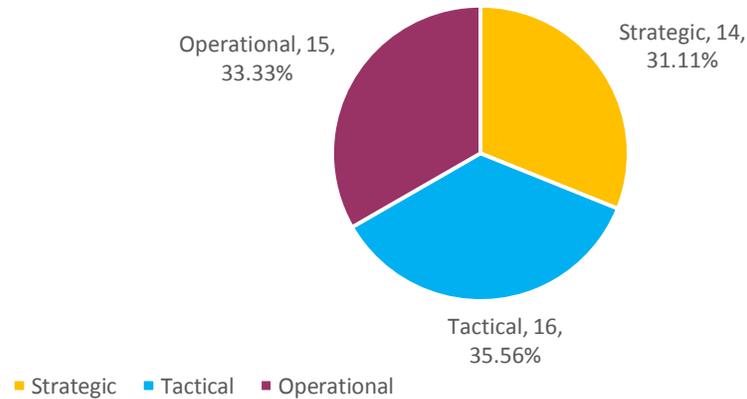
- In the “Apprenticeships” field of education, there are no courses within the “Strategic” level, and “Tactical” and “Operational” both have 4 courses each.
- In the “VET & CVET” field of education, the “Operational” management level contains the most courses, with 5. Meanwhile “Tactical” has 2 less, with 3, and “Strategic” contains less than half of “Operational”, with only 2 courses.
- There are 5 courses in the “Other” category, 3 of them at the “Strategic” management level, and 2 at “Operational”.

**Job group “Transportation Law and Law Enforcement”**

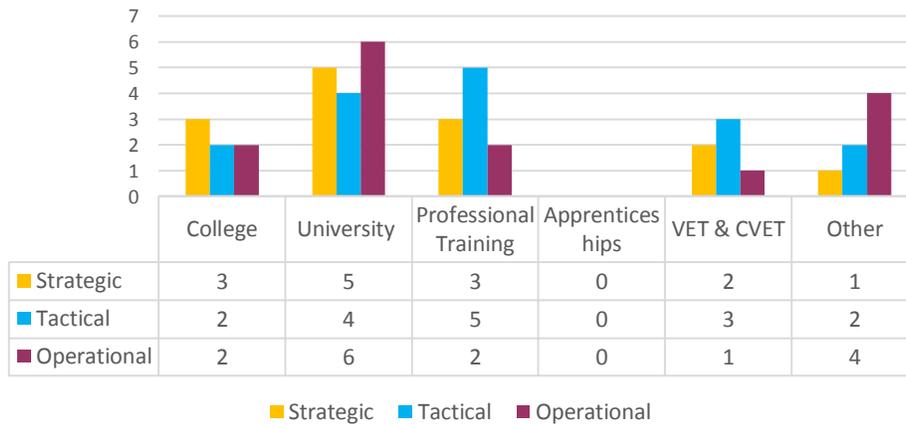
Figure 28 shows that the training schemes and

programmes are almost perfectly evenly spread amongst the three management levels within the “Transportation Law and Law Enforcement” job group, with the top and bottom management levels having a difference of merely 2.23% between each other.

“Tactical” is the top management level, with 16 courses, making up 35.56% of the total courses provided. Followed by this is “Operational”, with 15 courses, making up 33.33%, and lastly the “Strategic” level, with 14 courses, which makes up 31.11% of the total. Figure 29 shows that in the “Transport of Persons - Private Transport” job group, “University” is the education level with the most training schemes and programmes, having a total of 15, followed by “Professional Training” which has 10 courses. Meanwhile, “VET & CVET”, with only 6 courses and “Apprenticeships” with none are the smallest groups.



**Figure 28.** Distribution of training schemes and programmes amongst management levels in the job group “Transportation Law and Law Enforcement”.



**Figure 29.** Distribution of training schemes and programmes amongst fields of education in the job group “Transportation Law and Law Enforcement”.

In addition, the following conclusions can be made regarding the distribution of the data:

- The “College” field of education has quite an even distribution, as “Tactical” and “Operational” both have 2 courses, and “Strategic” has only 2 more, with 3.
- The “University” field of education also has a fairly even distribution, “Operational” being the greatest level, with 6 courses, followed by “Strategic” with 5, and “Tactical” with 4.
- “Professional Training” has quite an uneven distribution, as “Tactical” has 5 courses and “Strategic” has 3. Then, “Operational” has less than half the number of courses in “Tactical”, only having 2 courses.
- The “Apprenticeships” field of education has no courses at all.
- In the “VET & CVET” field of education, as the “Tactical” level contains 3 courses, while “Strategic” has 1 less, having 2, and “Operational” has one less than “Strategic”, containing only 1 course.

- There are 7 “Other” courses offered, 1 at the “Strategic” level, 2 at “Tactical”, and 4 at “Operational”.

**Job group “Safety & Security”**

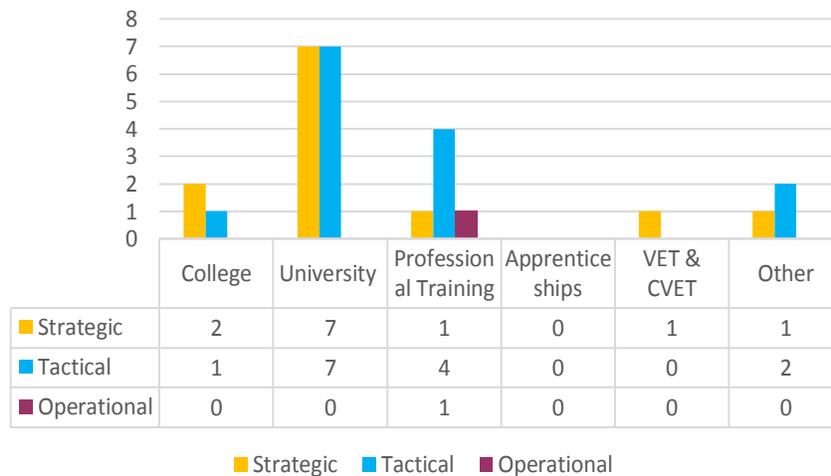
Figure 30 shows that the distribution of training schemes and programmes amongst management levels within the “Safety & Security” job group is quite uneven, as “Tactical” and “Strategic” each make up around half of the courses, with “Operational” being a very small section.

“Tactical” is the top management level, with 14 courses, making up over half (51.85%) of the total courses provided. Followed by this is “Strategic”, with 12 courses, which makes up just under half (44.44%). Lastly the “Operational” level has merely 1 course, and thus makes up only 3.70% of the total.

Figure 31 shows that in the “Safety & Security” job group, “University” is the education level with the most



**Figure 30.** Distribution of training schemes and programmes amongst management levels in the job group "Safety & Security".



**Figure 31.** Distribution of training schemes and programmes amongst fields of education in the job group "Safety & Security".

courses, with a total of 14 courses, followed by "Professional Training", with 6. Meanwhile, "VET & CVET" which has only 1 course, and "Apprenticeships", with no courses at all, are the smallest categories. Also, there is only 1 "Operational" course in this while job group, and it is in the "Professional Training" field of education.

Furthermore, the following deductions can be made regarding the distribution of the data:

- In the "College" field of education, "Strategic" contains 2 courses, and "Tactical" has half of this, with only 1 course. There are no "Operational" courses

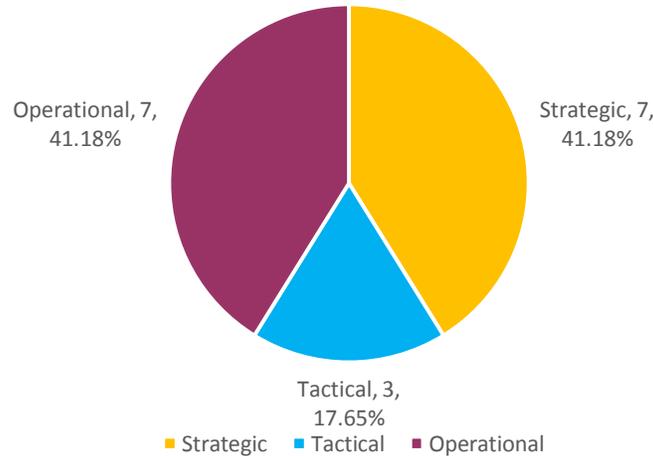
- In the "University" field of education, there are no "Operational" courses, and "Strategic" and "Tactical" both have 7 courses each.

- "Professional Training", being the only field of education in this job group to have courses across all three of the management levels, has 4 courses at the "Tactical" level, and only 1 each at both the "Strategic" and "Operational" levels.

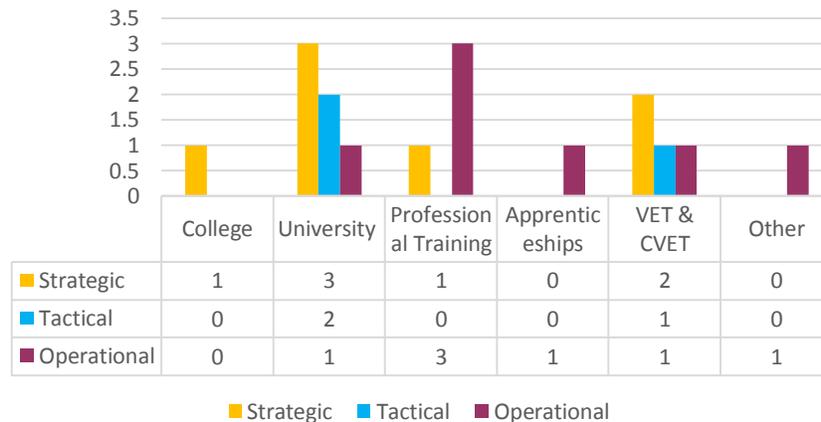
- The "Apprenticeships" field of education has no courses available.

- The "VET & CVET" field of education has only 1 course, and it is at the "Strategic" management level.

- There are 3 "Other" courses offered, 1 at the "Strategic"



**Figure 32.** Distribution of training schemes and programmes amongst management levels in the job group “Parking”.



**Figure 33.** Distribution of training schemes and programmes amongst fields of education in the job group “Parking”.

level, and 2 at “Operational”.

**Job group “Parking”**

Figure 32 shows that the distribution of training schemes and programmes amongst management levels within the “Parking” job group is quite uneven, “Operational” and “Strategic” are equal and make up most of the distribution, “leaving” Tactical with less than half the amount of either of the other groups.

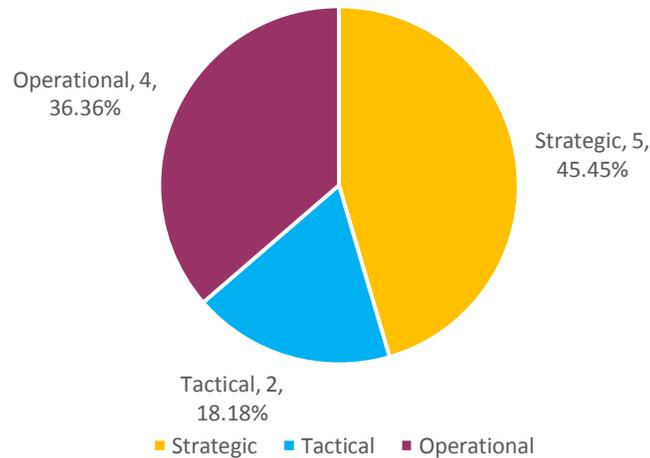
“Operational” and “Strategic” are both the top management levels, both with 7 courses, making up 41.18% of the total courses provided. This leaves “Operational” with only 3 courses, covering only 17.65%.

When further analysing Figure 33, it can be observed that in the “Parking” job group, “University” is the education level with the most courses, with a total of 6 courses, followed by “Professional Training” and “VET &

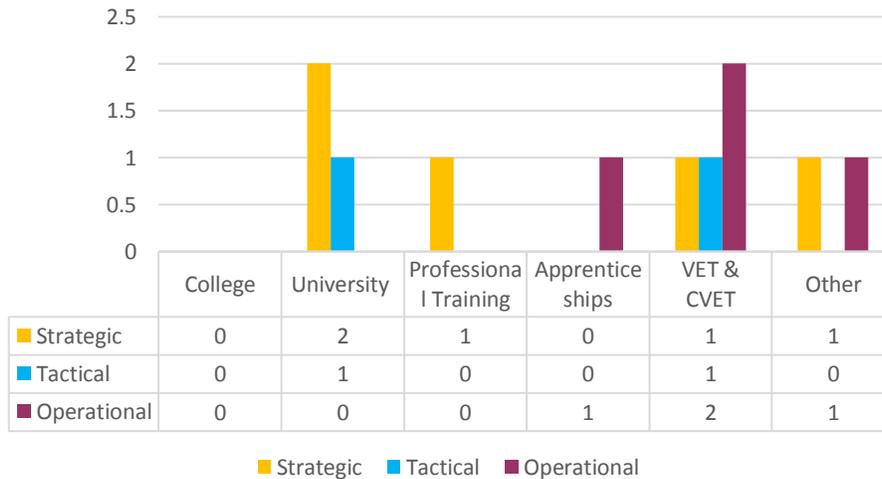
CVET”, both having 4 courses. Meanwhile, all the other groups have merely 1 course.

Moreover, the following conclusions can be drawn about the distribution of the data:

- In the “College” field of education, there is only 1 course available, and it is at the “Strategic” management level.
- The “University” field of education has an unbalanced distribution, as the “Strategic” management level has the most training schemes and programmes, having 3 courses. However, “Tactical” has 1 less, having only 2, and “Operational” has merely 1.
- The “Professional Training” field of education has no “Tactical” courses. It has 3 courses at the “Operational” level, but only 1 at the “Strategic”.
- In the “Apprenticeships” field of education, there is only 1 course available, and it is at the “Operational” management level.
- In the “VET & CVET” field of education, the distribution



**Figure 34.** Distribution of training schemes and programmes amongst management levels in the job group "Tolling/Pricing".



**Figure 35.** Distribution of training schemes and programmes amongst fields of education in the job group "Tolling/Pricing".

is uneven, as the "Strategic" management level contains 2 courses; while both "Tactical" and "Strategic" have half of this, both having only 1 course.

- There is 1 "Other" course, and it is at the "Operational" level.

### **Job group "Tolling/Pricing"**

Figure 34 shows that the distribution of training schemes and programmes amongst management levels within the "Tolling/Pricing" job group is quite uneven, as "Strategic" makes up nearly half of the courses. The other two management levels have the remaining courses spread between them unevenly too.

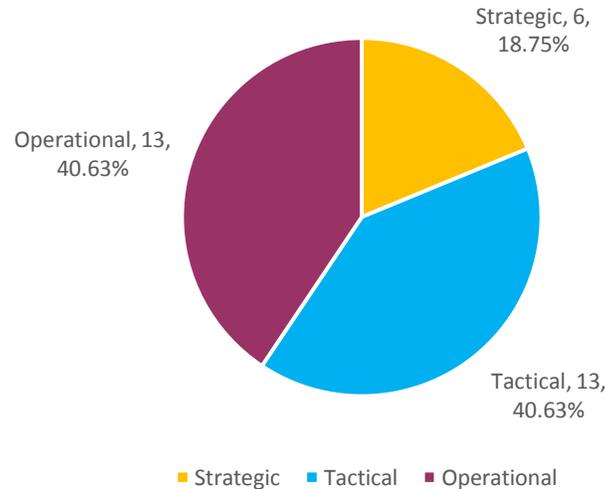
"Strategic" is the top management level, with 5 courses, making up just under half (45.45%) of the total courses

provided. Then, "Operational" provides one course less, thus providing 4 courses, and making up 36.36%; and lastly, "Tactical", with only 2 courses, makes up 18.18%.

Upon further analysing Figure 35, we can see it can be observed that in the "Tolling/Pricing" job group, "VET & CVET" is the education level with the most courses, with a total of 4 courses, followed by "University", having 3 courses. Meanwhile, "Professional Training" and "Apprenticeships", both with only 1 course, and "College", which has none, are the smallest groups.

Moreover, the following conclusions can be drawn about the distribution of the data:

- There are no courses available in the "College" field of education.
- The "University" field of education has an unbalanced distribution, as the "Strategic" management level has the



**Figure 36.** Distribution of training schemes and programmes amongst management levels in the job group “Service to Persons”.

most training schemes and programmes, having 2 courses. However, “Tactical” has 1 less, having only 2, and “Operational” has none.

- The “Professional Training” field of education has no “Tactical” or “Operational” courses, and has only 1 at the “Strategic” management level.
- In the “Apprenticeships” field of education, there is only 1 course available, and it is at the “Operational” management level.
- In the “VET & CVET” field of education, the distribution is uneven, as the “Operational” management level contains 2 courses; while both “Tactical” and “Strategic” have half of this, both having only 1 course.
- There are 2 “Other” courses, 1 at the “Strategic” level, and 1 at the “Operational”.

### **Job group “Service to Persons”**

Figure 36 shows that the distribution of training schemes and programmes amongst management levels within the “Service to Persons” job group is somewhat uneven, “Operational” and “Tactical” are equal groups and make up most of the distribution, leaving “Strategic” with less than half the amount of either of the other groups.

“Tactical” and “Operational” are both the top management levels, both with 7 courses, making up 40.63% of the total courses provided. This leaves “Strategic” with only 3 courses, covering only 18.75%.

Figure 37 shows that in the “Service to Persons” job group, “VET & CVET” is the education level with the most training schemes and programmes, having a total of 11, followed by “College” and “University”, both of which have 5 courses each. Meanwhile, “Professional Training” and “Apprenticeships”, both with 4 courses, and “Other” with

only 3 are the smallest groups.

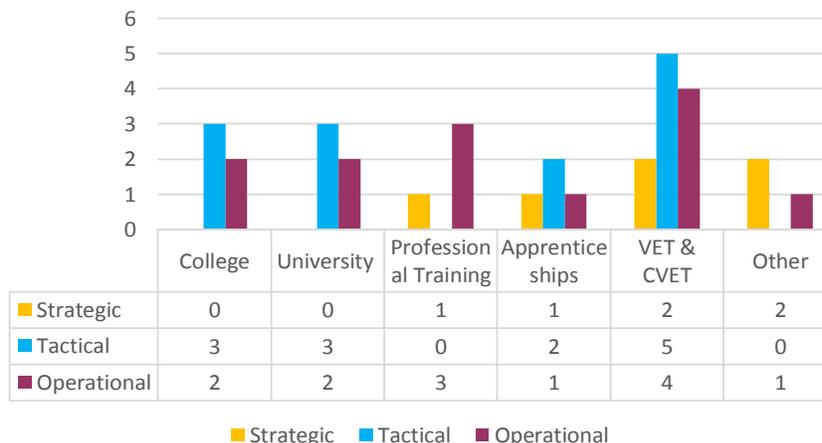
In addition, the following conclusions can be made regarding the distribution of the data:

- The “College” field of education has no “Strategic” courses. “Tactical” is its greatest level, with 3 courses, followed by “Operational”, which has 2 courses.
- The “University” field of education has exactly the same distribution as “College”.
- “Professional Training” has no courses at the “Tactical” level, only 1 at the “Strategic, but 3 at the “Operational” level. of courses in “Tactical”, only having 2 courses.
- The “Apprenticeships” field of education has 2 courses at the “Tactical” level, which is its largest management level. Both “Strategic” and “Operational” have half of this, both only having 1 course each.
- In the “VET & CVET” field of education, as the “Tactical” level contains 5 courses, while “Operational” has only 1 less, having 4. Meanwhile, “Strategic” has one less than half of the number of courses in “Tactical”, containing only 2 courses.
- There are 3 “Other” courses offered, 2 at the “Strategic” level, and 1 at “Operational”.

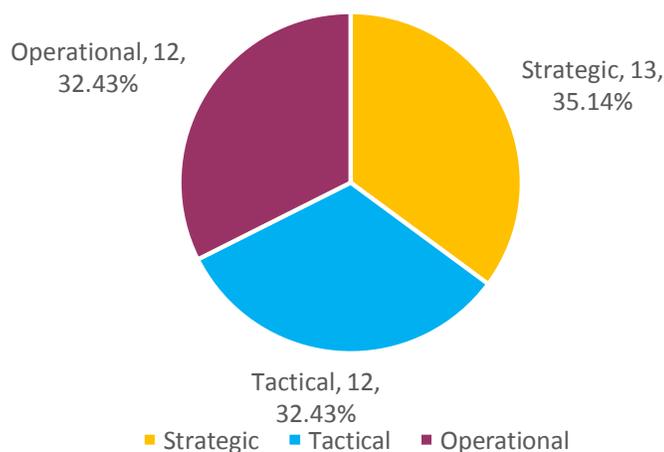
### **Job group “Academia/Research”**

Figure 38 shows that the training schemes and programmes are almost perfectly evenly spread amongst the three management levels within the “Academia/Research” job group, with the top and bottom management levels having a difference of merely 1.71% between each other.

“Strategic” is the top management level, with 13 courses, making up 35.14% of the total courses provided. Then, the rest of the courses are evenly spread amongst



**Figure 37.** Distribution of training schemes and programmes amongst fields of education in the job group “Service to Persons”.



**Figure 38.** Distribution of training schemes and programmes amongst management levels in the job group “Academia/Research”.

“Operational” and “Tactical”, both having 12 courses, and making up 32.43% of the total.

In Figure 39, it is visible that within the “Academia/Research” job group, “University” is the education level with the most training schemes and programmes, having a total of 22, followed by “College”, which has 12 courses each. Meanwhile, “Professional Training” and “Other”, both with no courses at all, are the smallest groups.

In addition, the following conclusions can be made regarding the distribution of the data:

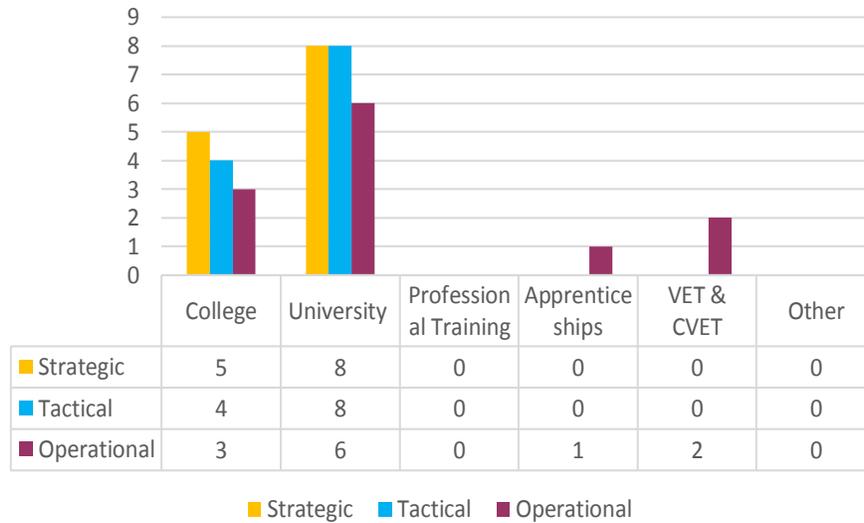
- The “College” field of education has 5 courses at the “Strategic” management level. It then has 1 less than this at the “Tactical” level, with 4 courses. Then, “Operational” has 1 less again, with only 3 courses.
- The “University” field of education has 8 courses at both the “Strategic” and “Tactical” management levels, both

being the greatest management level. Then, “Operational” is just below these two, with only 6 courses.

- “Professional Training” has no courses available at all within this job group.
- The “Apprenticeships” field of education has only 1 course available, and it is at the “Operational” level.
- In the “VET & CVET” field of education, there are 2 courses available, both within the “Operational” management level.
- There are no “Other” courses available.

## CONCLUSIONS

Gathering of data proved to be extremely difficult in many countries, therefore, rough assumptions had to be made and data have been amended accordingly, as this was the only solution to allow further data analyses.



**Figure 39.** Distribution of training schemes and programmes amongst fields of education in the job group “Academia/Research”.

Considering this approach and methodology, any conclusions drawn from the analyses presented in this study must be treated with caution. For example, the absence of training courses or evidence of training in some countries does not necessarily mean that training is not available; it may prove that in some cases the research team was unable to access information or evidence of the existing training courses and programmes.

The distribution in some job groups wholly fits the expected patterns, such as the main field of education providing courses within the “Academia/Research” job group being “University”.

However, the distribution within some of the other job groups is somewhat unexpected, and different to the distribution of actual jobs within the relevant job group. For example, in the “Safety & Security”, it would be expected that quite a large portion of courses, would be at the “Operational” management level. This, however, is not the case, as the “Operational” level unexpectedly only covers a mere 3.70% of all the courses within the “Safety & Security” job group.

Another such example can be found within the “Parking” job group. It would be expected that this particular job groups would have some courses at the “Strategic” management level; however, the actual percentage of courses at this level would not be expected to be as high as 41.18%, as this study suggests, and certainly not as high as the number of “Operational” courses.

As of now, the current practices in skills development for road transport in the countries included in this study do not show evidence for any harmonised procedures and/or best practice covering every job category (vehicles, infrastructure, freight and logistics, academia,

etc.). Each country seems to have developed training programmes and courses designed for a specific purpose and a restricted audience, serving a strategic local and national interests.

**ACKNOWLEDGEMENT**

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