

Abstract: Photographers, videographers, and other creative individuals have a growing workload and an increasing number of equipment that they need to carry every day. The damage of carrying heavy equipment has both short- and long-term effects on the health of these individuals. Mobility, fitting the user well and spreading the weight of the carrying system are key to reducing stress on the user's body and providing a comfortable experience. The objective of this research paper is to discover how to improve the overall user experience of transporting a carrying system. To obtain such information, interviews, questionnaires, observational research and desktop research have been conducted. By gaining the answers to the main research question, a list of requirements and a new Vertepac carrying system for photographers and videographers will be designed and prototyped that is comfortable and functional to be worn every day to allow for a productive and pleasant workflow.

Keywords: Carrying System, Stress, Mobility, Photography, Videography, Versatility, Efficiency, Convenience, Comfort.

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1. Introduction

The aims and objectives of this report are to get a better understanding of the target group's work, their experiences and how they conduct their work. In doing so, the researcher hopes to learn about their needs, wants in a carrying system and the potential uses they will have for it as the end goal of the project is to design an innovative carrying system for photographers and videographers, to see if there is a market for such a product, to try to learn about the key needs and wants of photographers and videographers in a carrying system and eventually use this research to ensure the product will be designed to target these user needs and sell them as USP's.

Every day, avid and professional outdoor adventure photographers have to deal with carrying heavy and fragile equipment that can cause stress on the body and discomfort overtime. Even with the rise of innovative tech bags, there is a gap in the market for functional, daily-use, camera transport-oriented backpacks that utilize specialized materials and technology for heavy duty hiking bags that are functional and can make a load of 5 kilos (or more) easier to carry. Through user-centered research and ideation, there is potential for backpacks to be created that may lessen the day-to-day burdens of lugging around heavy equipment to different locations through various forms of commute involving standing and walking for long periods of time. Photographers have very unique needs and expectations; therefore, a backpack design will be produced that is directed towards their necessities.

The problem addressed is important as there should be a better solution to transporting photography equipment. If the research is conducted thoroughly and accurately, a niche market or opportunity for a unique product may arise and should result in clear conclusions for what would make a highly demanded product. This research report is conducted for Vertepac, a manufacturer of a carrying system for avid hikers. Vertepac would like to expand and develop their technology for new markets to appeal to a wider audience. They are targeting consumers who carry heavy loads that need a carrying system that reduces and channels the weight off your shoulders to your hips. Vertepac's vision is to shape technology around your body to a level where it becomes an extension of yourself. They want to develop carrying systems that defy gravity, enhance performance and expand user freedom.

1.1. Main question

What are the possible ways to enhance and support the photographer's needs and capabilities during their journeys while still delivering a comfortable and functional carrying system that protects their gear?

1.2. Sub questions

1. What are the needs, uses and wants of photographers in a camera carrying system?

Interview, Questionnaire, Product reviews, Observational research, Desktop research.

2. What types of equipment and/or accessories do photographers need?

Interview, Questionnaire, Product reviews, Desktop research.

3. What are the main interactions that photographers do with carrying systems?

Observational research, Interview, Questionnaire.

4. What factors of a carrying system influence or affect photographers' flexibility, productivity and mobility during product use?

Observational research, Questionnaire, Interviews.

2. Research methodology:

2.1. Interview

Interviews are face-to-face consultations to get an understanding of people's thoughts, opinions, perceptions, motivation and behaviour. Interviews are beneficial to be conducted at the initial stages of a project to ask direct questions which can result in a solid base for primary research.

The goal in using this method is to get a good understanding of the target market's experiences in their jobs, photography bags and equipment they use. It is also to understand how the target group conduct their work and to get first-hand information on their experiences with photography bags as well as their needs and wants in photography/videography carrying systems. Interviews will be used to support answers for all four sub questions.

In order to get sufficient answers from the interview, a list of interview questions was formulated by breaking down the sub questions. Further questions were created based on missing or unsupported conclusions from the desktop research. The final set of questions were on pricing, equipment they bring, bags they have used, and equipment/features they need to conduct their work to a good standard. Three different photographer types were interviewed. An award-winning wildlife (and landscape) photographer, an award-winning eagle photographer (and slow-motion videographer) as well as an aerial/action videographer. These photographers and videographers were interviewed because of their experience and expertise in their field, as well as due to the variety of their field type, to gather information about a wider variety of photography fields. To start off the interview, an explanation of the project is given, and the objective of the interview is stated along with what the researcher planned to do with their input. The interview is then carried out, encouraging them to talk and requesting elaborate on answers that were undetailed. The interviews were also planned to be under 20 minutes to not take much of their time.

2.2. Questionnaire:

A questionnaire is a sequence of questions to be filled out by people in a specific target group to gain information on their needs, opinions and beliefs. It is research that can be gathered in a short period of time as is sent out in one go and conducted by a large number of people. The success of this method can be very important to understanding a target group well, therefore, it is important to have conducted prior interviews and desktop research.

The first aim of using a questionnaire is to gain data to figure out the main target group's demographics such as age, sex and occupation. The second aim of the questionnaire is to gain information on the target group's requirements, preferences and needs of a camera carrying system. Questionnaires will be used to support answers for all four sub questions.

In order to make the initial set of questions of the questionnaire, a list of topic areas was compiled to figure what results and data would be most useful. The topic list includes demographics, bag features, bag brands, limitations/benefits of bags, preferences, interaction with camera bags, equipment needs and budget. The next step is to formulate the questions itself in a style that is formulated clearly and

concisely so it won't take up much of the respondent's time. The order of questions was then rearranged, allowing for the 'quick' and 'easy' questions about the respondents themselves at the start, followed by the detailed questions. Any similar questions would be grouped together. Finally, the questions were tested with individuals asked to fill it out and adjusted according to the success of the feedback and results. Questionnaires were sent out via social media platforms to professional and avid photographers/videographers. The questionnaire was also posted to photography forums and discussion pages. It was requested that the respondents forward the questionnaire to any other experienced photographers they know. Finally, the data and results were compiled into charts, graphs and put into percentages so the data analysed in a visual manner. Processing the data into percentages and fractions allow for a better understanding of the results when triangulating and making conclusions.

2.3. Desktop research:

Trend foresight is used to indicate and analyse trends environmentally, politically, economically, socially, technologically and to study target group demographics. The trends can result in a solid product vision, direction and understanding of what may be demanded in the future.

The aim of using trend foresights is to get hints and early signals on potential threats and opportunities for the Vertepac business and future products that will be designed. There is also valuable target market research which can be used to give confidence in the direction of consumers of the design, understand the situation of the target market and see whether there might actually be demand from them. Desktop research will be used to support answers for sub question 2 as well as provide a solid base for market, competition, technological and human research.

The first step is to make a table of the different trend areas that would like to be researched. Then, noticing and noting down improvements, new and innovative aspects, reading into historical changes and areas where substantial research and development are being put into. The next step is to organize the trends from high to low innovation and impact. A variety of sources are used for trend research including video lessons on photography, competitor analysis, competitor product analysis, backpackers' forums, trend foresight, customer product reviews, brand trend analysis, scholarly articles, data analytic reports. These sources were also used to learn more about ergonomic research, anthropometric research, posture study, productivity and contexts where the product will be used.

2.4. Observational research:

User observation is the study of a target user in a specific situation to analyse the interactions, interrelations and experience between a person and a context or item. User observations are useful to see if a person is interacting in an expected manner and to learn about unexpected interactions.

The aim of using user observation is to support the conscious research results derived from interviews and questionnaires to see if the results can be supported by their subconscious actions. Observational research will be used to answer sub question 1, 3 and 4.

The first step of this method is to determine the specific target group, the context and what actions to observe. It is important to see the target group in a work context, however, due to the pandemic it is difficult to find photographers to observe in their work environment. The context has therefore been changed to a camera bag store to observe potential camera bag consumers. A list of actions to observe was developed to ensure that all aspects were considered. After that, the researcher observed three potential camera bag consumers, noting down observations, then inputting the observations into a table to analyse and process. General observations included interactions/actions at the camera bag store and with the camera bags. Other observational points included struggles/complaints, factors that were taking up their time, areas that were not looked at/tested/interacted with and the main features or USPs they were looking for. Staff interviews were conducted after to find further insights on the products. Camera bags were personally tested by the researcher to gain a better insight into the interactions and observations between the observed participant and the camera bag.

3. Results:

What are the needs, uses and wants of photographers in a camera carrying system?

The interview showed that removability, comfort and bag weight proportions are the most valuable factors when looking for bags. A questionnaire conducted by the researcher found in the appendix revealed that we should target Male users (62.5%) but also keep Female users (37.5%) into consideration. Vertepac may consider targeting men over 45 years old as they make up 59% of drone users. More than a third of data from the 18-24 category, (37.5%) however, online sources of research suggested that the largest consumer age group of photography drones suggested that it was actually 55-64. Therefore, this conclusion may not be valuable unless triangulated and supported. Regardless, the largest age group from the questionnaire was 18-24, which is important to consider their needs as a majority large consumer base. The second largest age demographic of this questionnaire are 35-44 yr olds taking up a quarter of respondents, followed by 45-54 yr olds (16.7%). As most of the users are 18-24, it can be linked that most respondents are freelance/students or do photography for part-time. This is an important demographic to consider as they may not have as much money to spend. 6 of the 24 respondents (25%) can afford to pay for the current Vertepac Medium carrying system. This is good to know as Vertepac is aware of this and is aiming for a niche market who want an innovative bag who can afford the \$359 price tag. The most desirable factors according to the questionnaire results are lack of back and shoulder strain, durability, capacity, waterproofing, carry-on friendliness and the number of compartments, pockets and dividers. The product reviews show that flexibility(10), weight(7) and balance(4) are the most valuable factors. Desktop research shows that 59% of drone owners are over-45. A vast majority of drone owners are male (96%). 68% of new drone users who had recently started in the last 12 months credited it to photography as the reason for taking it up as a hobby. Older generations have more disposable income and sometimes have more free time which could be a contributing factor to the soaring popularity.

What types of equipment and/or accessories do photographers need?

The Questionnaire concluded that Lowepro(1/3), Manfrotto (20.8%) and Peak design (12.5%) lead the popularity charts according to the questionnaire. It is important to look into what those brands do so well to have such a large market share and keep customers happy. 15 of the 24 respondents stated that a part of their job is landscape photography which involves traveling outdoors to capture their work. It would be safe to assume that they require waist belts and lots of equipment to meet the requirements of their situation. Portrait (58.3%) and Event (37.5%) photography were also a popular type of photography, often they only bring a specific set of equipment, and do not bring spares as they already know what kind of lighting, distance and context they will be working in, in advance. Videography (29.2%), Action (25%), Wildlife (20.8%) and Drone/aerial (12.5%) all need a wide variety of equipment as their "shooting schedule is often unclear" and often require a lot of movement. More than half the users use drones or would like to use drones in the future (54.2%). To design a bag that will last many years, it should probably have design features for drones/ drone equipment so it can continue to be used in the future. 45% stated they do not use drones, nor do they intend to use them in the future. To have space to accommodate space for drone accessories (DJI). From the political viewpoint, new rules and regulations are being introduced all the time, allowing for more freedom of drone usage and incentivising more research and development in drones - faster, more efficient, drones becoming less expensive and more accessible for general consumers. Approvals allowing more

users to fly drones - consumer drone hobbyists could be a potential market. The drone delivery R+D is enormous, perhaps drone delivery pilots could be a potential market for drone bags. Military drones and their gear could be a potential market. Firefighters and their gear could be a potential market as well. Lenses (50%), batteries (23.3%) and SD cards (13.3%) should have easy-access pockets as these items are by far the most commonly retrieved equipment pieces. Generally, users would like certain components of the bag to be detachable. 41.7% stated they would like internal dividers to be detachable, this may be because different excursions/jobs require different equipment and bag components. 37.5% stated they would like rain covers to be detachable, and a third stated they would like the waist belt to be detachable, this may be because they do not use it on every excursion, only longer trips where they require a lot of walking or hiking. 25% or more respondents stated they would like wheels and tripod holders to be detachable. Technological advancements may mean less battery compartments needed in bags in the future. Drones are becoming more durable as well meaning they may be able to hang on the bag externally, saving space. FAA introduced new drone rules, allowing operators to fly over people and during the night. (it will require remote identification technology to pinpoint them for FAA and law enforcement). Drones represent the fastest growing transportation sector (1.7 mil drone registrations and 203k FAA certified pilots. UPS won first approval to operate drone delivery in Oct 2019. Alphabet got certification for single-pilot drone operation. Amazon granted permission for delivery trials in September 2020. Google granted approval to use drones for firefighting research this month. DSLR cameras are becoming more niche. Product photographers becoming more skilled in videography. 360-degree photography has become more popular. Rise in use of nature and landscapes in product photography. Film photography is growing. More people are searching for drones. "Camera and lens backpack" Google search queries increased 550% in the US. "Waterproof camera backpack" Google search queries increased 80% over the last year in the US. "DJI Mavic Mini" Google search query has increased. Batteries evolving and improving. Drone range increasing to 100 miles. Increase in use of cloud storage. Drones are becoming cheaper and better.

What are the main interactions that photographers do with carrying systems?

The user observation suggested that accessibility, comfort, capacity, weight and material choice are the most important factors. The results from the questionnaire showed that $\frac{1}{3}$ of users take off their bag/carrier at least once an hour, and 45.8% take it off once or more than once every 15 minutes. It could be vital to design a backpack that can be efficiently taken off or does not need to be taken off to retrieve items from. Almost half the respondents (45.8%) choose to not fully wear their bag/carrier as designed. It could be assumed that it is to reduce the extra effort and time of fully taking off the backpack when needing to retrieve items frequently. Perhaps it would be wise to design a backpack that can be swung around the user, allowing them to wear the bag/carrier as designed for maximum comfort and convenience. A third of users preferred taking items from the bag when on one shoulder. This may be due to the fact that it allows the user to reach most items from the bag without taking it off fully. The second-largest group of responses at 30%, preferred to take items from a chest position. 41.7% stated that placing the bag on its side gives them comfort in knowing their equipment is safe. This may be due to the user finding comfort in the bag being on a large surface area, so it is less likely to roll around/fall over. It may be good to consider a grounded exterior design of the bag to be able to lay down on its side or to stay upright without falling over/rolling over. Another 41.7% said that upright position was most preferred.

What factors of a carrying system influence or affect photographers' flexibility, productivity and mobility during product use?

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4. Discussions

4.1. Interview discussion:

Interviews were useful to conduct to learn about the day-to-day tasks, how photographers carry out their work and what is needed for them to get successful results and to be productive. In particular, useful results were gained about understanding the needs and frustrations of camera carrying systems. Interviews also helped with identifying areas of where further information needed to be gathered and researched.

Interviews were a credible source as the interviewees were all award-winning or experts in their field. The study could have been conducted better through a larger number of interviews; however, it was difficult to find experts to interview as many of them did not respond to the interview requests. It could have also been conducted better by doing more interviews at a later stage of the research, to get more detailed answers for any further questions, topics or experiences that were unclear or that needed further research. A limitation of this study was that it is only considering what the interviewees think and say, which may not provide as accurate or detailed results as they may hold back, forget information or misunderstand the question. In the future, if this research method were to be attempted again, pilots would be run to ensure that the method would be smooth with real participants and less “why” questions would be asked as the interview often went on a tangent and it was noticed that often the interviewees became irritated or found it difficult to answer.

It is an appropriate research method of receiving information on what they consciously know, in order to validate and support the research results observational research will be conducted to see what they subconsciously do and how they use/do something. All in all, the results from this research will be used to make requirements, find what components are most important, what are essential to the interviewees while providing valuable knowledge into the context where the photographers and videographers work, as well as where and how the carrying system might be used.

4.2. Questionnaire discussion:

Questionnaires were a useful research method for gathering large quantities of specific information on the respondents' habits and experiences. It was useful because the data received was analysed to triangulate and support the research from interviews and desktop research, while providing more data into the potential target market's beliefs, opinions and experiences.

Questionnaires are a credible source. 28 responses were recorded, with two of the responses removed due to a lack of useful data and/or strong language. The conclusions and results from 26 responses were analysed and it was concluded that the questionnaire was not fully credible because a large portion (33%) of the study was conducted on 18-24-year-olds. This may be due to more of this age group being active on social media, which was a large source of where the questionnaire respondents were contacted. A wider range of target-group ages as well as a larger quantity of responses could make this study more credible, however, it does not mean that this study is useless or that the data received is inaccurate as every respondent is part of the photography/videography target market, so their responses on their experiences and opinions are still valid and useful. One limitation of this research method was that some of the respondents got lazy and did not answer the questions to their fullest. The initial few respondents chose to not fully answer all the questions and when the researcher

noticed, the question settings were changed to be mandatory to fill out completely, so the initial few results were lacking. On top of this, respondents came from across the world, so a few respondents did not understand the currency (euros) which was used in the question about budget. If the questionnaire was to be done again by the researcher, the price in US dollars would also be mentioned as most countries across the world use US dollars or use it to compare the value of their own currency against, so it would allow for a wider range of respondents to understand the question. Most respondents seemed to find this study a chore, as a result, many of the questions were pre-filled out as a drop-box or a tick-box answer to save them time so they would not get demotivated or frustrated to type in every answer. Because of this, many of the questions did not give details on the "why" or the reasoning behind their answer, which could have been even more useful to understand the respondents and data better. It is not possible, however, to ask respondents to explain their reasoning behind their answers without taking up more of their time, so the researcher is faced with a time-(beneficial) data dilemma. Next time, the researcher could allow for one or two of the most important questions to require a brief explanation, to not take up too much more of their time.

Questionnaires were an appropriate research method for that stage in the research as it was timesaving and gathered large quantities of data while not requiring the researcher to do repeat, manual research on target users. It was convenient that the questionnaire data could be displayed in a visual manner including graphs and charts, which allowed for visual conclusions which could be analysed easily.

4.3. Desktop research discussion:

It was useful to use desktop research to aid my base of my research in being able to read up on many articles, reports and information to gather knowledge about trends, the market, the competition, the competition's USPs and their pricing. It was also valuable to understand the types of photography and the equipment they use to understand what the carrying system may need to be able to protect and store.

Desktop research is a secondary research method, so it depends on the type of sources that are being used. Trying to use reliable and credible sources, journals and articles from credible sources and reports were mainly used. The limitations of this method are that each source may not be 100% reliable as it is often not clear where they got their results, conclusions or information from. To improve the reliability of this method, a wider range of higher quality sources and more sources in general could be used to support conclusions.

Using desktop research at the initial stage was appropriate as it allowed for a good understanding of the gaps, see what was missing to and needed to be researched or supported further in my primary research methods.

4.4. Observational research discussion:

Observational research was not as useful as it could have been due to the restrictions caused by the pandemic. Results that were derived included how the user interacts with the product and what the consumer finds to be most valuable in a bag. Further results could not be concluded due to its small sample size and the lack of real-life context.

Although the approach to the research was well rounded by a variety of primary and secondary sources being used, improvements could be made in the future regarding the number of results and the location of where the research was conducted. By using a larger sample size and researching in the context of work rather than in a camera bag shop could have allowed for more interactions to be seen. The value of doing research in person and observing the more accurate subconscious results from the observational participants' actions, habits and examinations.

Observational research was very appropriate as it was the only real-life research that was conducted so being able to look, feel and test the surroundings as well as the product itself allowed for a better understanding of how the product looks, feels and works in-person.

5. Conclusion:

What are the possible ways to enhance and support the photographer's needs and capabilities during their journeys while still delivering a comfortable and functional carrying system that protects their gear?

In today's day and age, photographers are subjected to carrying many heavy camera bodies, lenses, batteries and other camera gear that comes with it. The carrying system that will be designed will allow the user to not be restricted or feel much of the weight over a specific part of their body. Since the heavy weight of camera equipment can cause stress and strain if loaded on a specific part of the body, the system will spread this force over a larger area. Photographers tend to take off their carrying systems very frequently to access, replace or return items. With the help of the system, the user will be able to take out and store gear in few steps without any unnatural or straining movements. With such a wide range of photographers, the loadout types they require are endless. By enabling compartments and dividers to be removable or adjustable, various loadouts can be adjusted by the user according to their needs. Photographers find that carrying systems often lack the high-tech materials that protect their equipment how they want to. Waterproof, abrasion-proof, durable and lightweight carrying systems are difficult to come by, and expensive. The carrying system that is to be developed will follow the set requirements that have come from this report and should be suitable for any photography type and environment. This system can prove to change the way photographers carry their equipment ensuring that future photographers no longer need to feel strain, exhaustion or need to worry about the protection of their equipment.

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7. Appendix:

Appendix A - Interview:

A1. Eagle Videographer and Photographer (Name available on demand)

| Question: | Answer: |
|---|--|
| What equipment do you usually take to your photography shoots? | Equipment list: -High-end Nikon 800m? -X3-4 extra camera lenses -X2-3 camera bodies -X1 sony 4K video camera -X5 spare batteries for video camera -X1 slow motion high-speed camera (1 extra) -X3 spare batteries for high-speed camera -Computer |
| What bags do you currently use or have used in the past? | Bags brands: Think tank photo backpack Lowepro - Lens trekker 6802/lp6802? |
| Tell me a bit about the needs of a bag in your job and your experiences. How long do you usually walk around with your bag/carry it around? | -Take backpacks off quickly -Put backpacks on quickly -Two bags -Moving over with scenery -Need to change lenses -On one shoulder |
| What do you not like about your current bag or bags that you have used in the past? | Issues: -That i have to carry it -Shoulder pain -He puts items gently in bag so they move about -Batteries are a significant weight -Lenses are huge weight + size -Backpack is too wide for carry on -Backpack that balances the weight from the back and front -Pulls the user back from the shoulders |
| What kind of features do you want in your bag? | -Camera batteries are not as dangerous but fireproofing would be nice -Keep battery compartment warm -Side zip if compartmentalized -Lots of compartments with zips |

| | |
|---|---|
| | <ul style="list-style-type: none"> -Lighter items on top, heavier items on bottom -Only use hip strap for long distances -To take off hip strap - only if you can attach + detach easily -If i could take off the wheels that would be fantastic -Best bag was a hiking bag, so if you could have features of a hiking bag that would be great -Smaller bag that you can zip off would be fantastic” -Restricted with hand luggage weight (max 8kg)” -Prefer hand luggage |
| I would like to know about your budget. Do you think 400 euros is expensive for a bag? If so, how much would you pay? | -I don't have a budget, I pay for the best. |

A2. Wildlife Photographer (Name available on demand)

| Question: | Answer: |
|---|--|
| What equipment do you usually take to your photography shoots? | <p>Equipment list:</p> <ul style="list-style-type: none"> -X1 Bigger lens -X2-3 camera bodies -X2-3 lenses -X3 spare camera batteries -SD cards -Towel <p>Sometimes:</p> <ul style="list-style-type: none"> -X1 Tripod -Laptop/tablet -Portable harddrive |
| What bags do you currently use or have used in the past? | <p>Bag brands:</p> <ul style="list-style-type: none"> -Gura gear Chiboko 30L -Mine shift/ Think Tank moose peterson 1 |
| Tell me a bit about the needs of a bag in your job and your experiences. How long do you usually walk around with your bag/carry it around? | I use the bag to safely protect and hold all my spare camera bodies, lenses and batteries. I usually have my bag in the back of the safari car. So I usually don't carry it that far. |

| | |
|--|---|
| <p>What do you not like about your current bag or bags that you have used in the past?</p> | <p>Issues:</p> <ul style="list-style-type: none"> -No laptop sleeve/space -Heavy bags -Airline weight restrictions -Big lenses can be heavy -Straps break -Straps uncomfortable -Condensation can affect camera -Dust |
| <p>What kind of features do you want in your bag?</p> | <p>Needs:</p> <ul style="list-style-type: none"> -Versatility e.g. changing compartments/dividers -Space for big lenses -Rain cover -Extra zippers -Padding at bottom of backpack -Stability at bottom of backpack so it can stand -Wheels on backpack where you can add/take off -Good support on back -Fit lenses + camera body connected together -Strap that can hold all weight on one strap -Dust proof + can wipe down <p>Other comments:</p> <p>“Smaller backpack that zips off would be nice”</p> <p>“I personally do not need wheels on the backpack but if travelling in the airport, wheels can be beneficial”</p> <p>“Fireproofing would not be necessary but could be nice if it doesn’t add weight”</p> <p>“Insulation is not a real issue”</p> |
| <p>I would like to know about your budget. Do you think 400 euros is expensive for a bag? If so, how much would you pay?</p> | <p>Not more than 400 euro</p> |

A3. Drone Videographer + Video Producer (Name available on demand)

| Question: | Answer: |
|---|--|
| <p>What equipment do you usually take to your photography shoots?</p> | <p>Equipment list:</p> <ul style="list-style-type: none"> -X1 Remote (\$700-1000) (Taraxis, FR sky) |

| | |
|---|---|
| | <ul style="list-style-type: none"> -X1 Goggles (\$800) -X3 Spare goggle batteries -X1 GoPro Hero 7 (\$500), Action drift, Mobius -X3 Spare GoPro batteries(\$40X3) -128GB SD Card (lasts 45 min) -X1 Drone (\$500) -X30 Spare drone batteries (\$30X30) -Camera patches + mounts <p>Sometimes:</p> <ul style="list-style-type: none"> -X1 Multibattery charger |
| What bags do you currently use or have used in the past? | <p>Brands:</p> <p>Batteries- T60 action videography</p> <p>Drones:, DJi</p> <p>Cameras:Go pro, Action Drift, Mobius</p> <p>Remote: FR sky, Taranis</p> |
| Tell me a bit about the needs of a bag in your job and your experiences. How long do you usually walk around with your bag/carry it around? | I use my bag to hold all my spare equipment and attachments. I usually throw it in the back of the truck and drive to the location. Then i'll carry it for a minute or two to the exact place. |
| What do you not like about your current bag or bags that you have used in the past? | <p>Issues:</p> <ul style="list-style-type: none"> -Really uncomfortable straps -No cushioning -Bag becomes a ball at the top -Center of gravity pulls the user back |
| What kind of features do you want in your bag? | <p>Needs:</p> <ul style="list-style-type: none"> -Waterproof for non-waterproof drones -Plenty of spare batteries -Clip on outside of bag -Method for securing -Foam cutouts -Additional cameras -Fire proof internals for batteries -Hip support (for up to 40-60 pounds) -Insulation to keep contents above 0 celsius -Spacious interior -Fits items and remote case perfectly -Zips up from the side -Less than 2ft wide -Space for heavier items at the bottom -Minimum 17l? |

| | |
|--|--|
| | <p>-Thinner + flatter bag?</p> <p>Other comments: "Coated silicone on drone for waterproofing, maybe you can implement it in the bag" "Insulation is necessary otherwise there might be voltage surge"</p> |
| <p>I would like to know about your budget. Do you think 400 euros is expensive for a bag? If so, how much would you pay?</p> | <p>Money is not a big issue.</p> |

Appendix B - Questionnaire:

| Respondant Number | What is your age? | What is your gender? | What type of photography do you mainly do? (Multiple answers allowed.) |
|-------------------|-------------------|----------------------|--|
| Respondant 1 | 18-24 | Male | Event, Landscape, Portrait, Architecture, Journalism |
| Respondant 2 | 18-24 | Male | Product, Drone/Aerial, Event, Action/sports, Videography/Video or Film making |
| Respondant 3 | 18-24 | Male | Drone/Aerial, Action/sports |
| Respondant 4 | 18-24 | Male | Action/sports, Videography/Video or Film making, Landscape, Automotive |
| Respondant 5 | 55-64 | Male | Wildlife, Astrophotographer |
| Respondant 6 | 45-54 | Male | Wildlife, Action/sports, Videography/Video or Film making, Landscape, Architecture |
| Respondant 7 | 18-24 | Male | Drone/Aerial, Landscape, Architecture, City/street |
| Respondant 8 | 45-54 | Male | Action/sports, Landscape, Portrait |
| Respondant 9 | 18-24 | Female | Landscape, Portrait, Wedding |
| Respondant 10 | 25-34 | Female | Event, Portrait, Love & New Born |
| Respondant 11 | 35-44 | Female | Wildlife, Portrait |
| Respondant 12 | 45-54 | Male | Landscape, Portrait, Architecture |
| Respondant 13 | 25-34 | Female | Landscape, Portrait |
| Respondant 14 | 18-24 | Female | Landscape, Portrait, Wedding |
| Respondant 15 | 18-24 | Male | Event, Action/sports, Landscape, Portrait |
| Respondant 16 | 35-44 | Male | Event, Videography/Video or Film making |
| Respondant 17 | 55-64 | Female | Wildlife, Landscape |
| Respondant 18 | 35-44 | Male | Event, Portrait |
| Respondant 19 | 18-24 | Female | Event, Landscape, Portrait, Architecture |
| Respondant 20 | 35-44 | Male | Videography/Video or Film making, Portrait, Street photography |
| Respondant 21 | 35-44 | Male | Wildlife, Videography/Video or Film making, Landscape, Urban |
| Respondant 22 | 35-44 | Female | Landscape |
| Respondant 23 | 45-54 | Male | Videography/Video or Film making, Portrait |
| Respondant 24 | 25-34 | Female | Landscape, Portrait |
| Respondant 25 | 45-54 | Male | Action/sports, Landscape, Portrait |
| Respondant 26 | 35-44 | Male | Wildlife, Drone/Aerial |

| Rate price in order of importance | Rate durability in order of importance | Rate brand name in order of importance | Rate weight in order of importance | Rate capacity/size in order of importance | Rate color/design in order of importance | Rate sustainability in order of importance | Rate waterproofing in order of importance | Rate security features in order of importance | Rate ability to attach (items externally) in order of importance | Rate lack of back + shoulder strain in order of importance | Rate airplane carry-on friendliness in order of importance | Rate number of pockets + compartments in order of importance | Rate ergonomic features in order of importance | Rate glove-friendliness in order of importance | Rate airflow + heat dissipation in order of importance |
|-----------------------------------|--|--|------------------------------------|---|--|--|---|---|--|--|--|--|--|--|--|
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 |
| 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
| 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 |
| 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 |
| 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |
| 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 |
| 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 |
| 3.11834615 | 4 | 2,48 | 3,36 | 3,92 | 3,36 | 3,36 | 3,76 | 3,24 | 2,96 | 4,16 | 3,6 | 3,6 | 3,52 | 3,48 | 2,68 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
|---|---|--|--|---|--|---|--|---|--|---|--|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| What is your favourite bag brand at the moment? | Are there any restrictions/limitations that photography bags | Are there any features of your bag that you don't use or need? If yes, | How often do you take off or retrieve something from your bag during | How do you usually wear your photography bag? | What position do you most conveniently wear your photography bag when retrieving | What position are you most comfortable with in terms of safety of the | Do you use drones for your photography work? | What items/equipment in your bag do you access the most? Please state | Of your current photography bag, what components would you | What is the most you are willing to pay for a new bag/camera? | If you would be interested in helping me out in the future, please enter your email below. | | | | | | | | | | | | | | |
| Peak Design | Yes, there is a high possibility that there will be a lot more than once every 15 mins using both shoulder straps | Once an hour | Once an hour | Using both shoulder straps | On your chest | On its back | Yes | Camera | None of the above | 100 - 149 euro | tyzgg5e@gmail.com | | | | | | | | | | | | | | |
| Oakley | It difficult to ride a bike into use every feature on the bag | Once every 2 mins to use every feature on the bag | Once every 15 minutes | Using both shoulder straps | Placed down, on its side | On its side | Yes | LiPo Batteries | Waist belt, Cushioning, Rain cover | 100 - 149 euro | Lrossubc@gmail.com | | | | | | | | | | | | | | |
| Manfrotto | - | - | Once every 30 minutes | On one shoulder | Placing it down | Standing upright | Yes | SD's and batteries | Anything is detachable and | 99 euro or less | | | | | | | | | | | | | | | |
| Manfrotto | Number of compartments. When there is no the size of an SD card, it's not worth it | None | Once every 30 minutes | On one shoulder | On your chest | On its side | Yes | Change lens | Zips/compartments, Tripod | 350 - 449 euro | ai/redubullandskites | | | | | | | | | | | | | | |
| Lowepro | It would be to see a sleek, aestop handle, personally not | Once an hour | Once an hour | On one shoulder | On one shoulder strap | Standing upright | Yes | batteries, tripod extensor | Wheels | 100 - 149 euro | james.ash1051@hotmail.co.uk | | | | | | | | | | | | | | |
| No favorite brand | WANDRD | - | Once an hour | On one shoulder | Placed down, on its back | On its side | No | ly lenses and memory card | None of the above | 99 euro or less | Shotakenphoto@gmail.com | | | | | | | | | | | | | | |
| No preference | sign bags that don't directly | - | Once every 15 minutes | On one shoulder | Placed down, on its back | On its side | No | cameras lenses | None of the above | 100 - 149 euro | | | | | | | | | | | | | | | |
| None | None | None | Once every 15 minutes | On one shoulder | On your chest | On its side | Yes | Pockets | Internal dividers, Cushioning | 99 euro or less | | | | | | | | | | | | | | | |
| Lowepro | none | Film pocket | Once every 15 minutes | On one shoulder | On one shoulder strap | Standing upright | Yes | Lens | Internal dividers, Rain cover | 100 - 149 euro | grant.whilehouse@gmail.com | | | | | | | | | | | | | | |
| Manfrotto | - | - | Once an hour | On one shoulder | On one shoulder strap | On its side | Yes | interchangeable batt/dividers, Rain cover, Tripod | None of the above | 200 - 349 euro | | | | | | | | | | | | | | | |
| WANDRD | - | - | Once an hour | On one shoulder | Placed down, on its back | On its side | No | ly lenses and memory card | None of the above | 99 euro or less | Shotakenphoto@gmail.com | | | | | | | | | | | | | | |
| Lowepro | Nothing specially | Shoulder bag | Once every 15 minutes | On one shoulder | Reaching behind | On its back | No | Camera, lens, SD card, batt | Wheels | 350 - 449 euro | woolymal@hotmail.com | | | | | | | | | | | | | | |
| Peak Design | gh to support different use | None | Once an hour | On one shoulder | On your chest | Standing upright | Yes | Lenses and batteries | Internal dividers, Cushioning | 200 - 349 euro | | | | | | | | | | | | | | | |
| Thule | into natural landscapes | N/A | Once every 30 minutes | On one shoulder | On one shoulder strap | On its side | No | Lens | Wheels | 200 - 349 euro | | | | | | | | | | | | | | | |
| Lowepro | to use the right one for my natural side pockets are used | keep it off most of the time | Once an hour | On one shoulder | Placed down, on its back | Standing upright | No | lens | Internal dividers | 100 - 149 euro | | | | | | | | | | | | | | | |
| Don't know any! | too large, spend ages digi that is attached at the top | Once an hour | Once an hour | On one shoulder | On one shoulder strap | Standing upright | Yes | Lenses, SD cards | Waist belt, Internal dividers | 99 euro or less | saltera13@gmail.com | | | | | | | | | | | | | | |
| Manfrotto | None | None | Once an hour | On one shoulder | Across the chest/slinger | Standing upright | No | Lenses, batteries | Waist belt, Rain cover, Tripod | 99 euro or less | | | | | | | | | | | | | | | |
| Lowepro | events me from taking my come across unused feature than once every 15 mins across the chest/slinger | Can't think of any | Once every 2 hours | On one shoulder | Placing it down | Standing upright | No | Camera, lens, microphones | Internal dividers, Cushioning | 100 - 149 euro | cjeuring@hotmail.com | | | | | | | | | | | | | | |
| Lowepro | No | No | Once every 15 minutes | On one shoulder | Slide compartment | On its back | Yes | Lenses | None of the above | 450 euro or more | | | | | | | | | | | | | | | |
| Manfrotto | - | - | Once an hour | On one shoulder | On one shoulder strap | On its side | Yes | interchangeable batt/dividers, Rain cover, Tripod | None of the above | 100 - 149 euro | | | | | | | | | | | | | | | |
| No favorite brand | n not using camera for my n not using camera for my | Once an hour | Once an hour | On one shoulder | Placed down, on its back | Standing upright | No | None | Waist belt, Rain cover | 150 - 199 euro | | | | | | | | | | | | | | | |
| f-stop | to fit into a cabin, with 2 bos on external of bag, the | Once every 30 minutes | Once every 30 minutes | On one shoulder | Placed down, on its back | On its front | Yes | lenses, bodies | Internal dividers, Rain cover | 350 - 449 euro | graz.wood@gmail.com | | | | | | | | | | | | | | |

Ages of photographers:

| Age range: | Percentage: | Quantity: |
|------------|-------------|-----------|
| | | |

| | | |
|-------|-------|---|
| 18-24 | 37.5% | 9 |
| 35-44 | 25 | 6 |
| 45-54 | 16.7 | 4 |
| 25-34 | 12.5 | 3 |
| 55-64 | 8.3 | 2 |
| 65+ | 0 | 0 |

Gender:

| Gender: | Percentage: | Quantity: |
|----------------|--------------------|------------------|
| Male | 62.5% | 15 |
| Female | 37.5% | 9 |

Photographer/videographer types:

| Type: | Percentage: | Quantity: |
|--|--------------------|------------------|
| Landscape | 62.5 | 15 |
| Portrait | 58.3 | 14 |
| Event | 37.5 | 9 |
| Videography/filmmaking | 29.2 | 7 |
| Action/sports | 25 | 6 |
| Wildlife | 20.8 | 5 |
| Architecture | 20.8 | 5 |
| Drone/aerial | 12.5 | 3 |
| Urban/street | 12.5 | 3 |
| Automotive, Journalism, Product, Love/newborn | 4.2 | 1 |

Feature ranking of importance:

| Ranking: | Criteria: | Average (1-5. '5' being most important): |
|-----------------|------------------------------------|---|
| 1 | Lack of shoulder + back strain | 4.16 |
| 2 | Durability | 4.00 |
| 3 | Capacity/size | 3.92 |
| 4 | Waterproofing | 3.76 |
| 5 | Number of pockets + compartments | 3.6 |
| 6 | Carry-on friendly | 3.6 |
| 7 | Ergonomic features | 3.52 |
| 8 | Weight | 3.36 |
| 9 | Color/design | 3.36 |
| 10 | Sustainability | 3.36 |
| 11 | Security | 3.24 |
| 12 | Price | 3.11 |
| 13 | Glove friendliness | 3.08 |
| 14 | Ability to attach items externally | 2.96 |
| 15 | Airflow/heat dissipation | 2.88 |
| 16 | Brand name | 2.48 |

Bag brand popularity:

| Brand name: | Percentage: | Quantity: |
|--------------------|--------------------|------------------|
| Lowepro | 33.3 | 8 |
| Manfrotto | 20.8 | 5 |

| | | |
|---------------|------|---|
| Peak design | 12.5 | 5 |
| WANDRD | 8.3 | 2 |
| Thule | 4.2 | 1 |
| Oakley | 4.2 | 1 |
| No preference | 16.6 | 4 |

Restrictions that bags have caused to work:

- Poor back support makes it difficult to ride a bike in remote areas:
- Bag aesthetics looking like photography bags
- Main compartment being too large, spending time looking for item in bag
- Lack of easy access to camera in bag
- Weight
- Ability to customise interior to support different uses
- Maneuverability + space efficiency - Bulky camera bag
- No way to secure tripod on the top
- Number of compartments
- Wheels
- Stress on back

Features which are not used:

- SD card holders
- Detachable straps
- Top handle
- Buckles
- Pocket for films
- External side pockets
- Internal wallet pocket

Frequency of bags taken off to retrieve something:

| Frequency: | Percentage: | Quantity: |
|---------------------------------|-------------|-----------|
| Once an hour | 33.3 | 8 |
| More than once every 15 minutes | 25 | 6 |
| Once every 15 minutes | 20.8 | 5 |
| Once every 30 minutes | 16.7 | 4 |

| | | |
|----------------------|-----|---|
| Never take it off | 4.2 | 1 |
| Off most of the time | 4.2 | 1 |

How are bags usually worn?

| Style: | Percentage: | Quantity: |
|--|--------------------|------------------|
| On one shoulder | 45.8 | 11 |
| Using both shoulder straps | 25 | 6 |
| Using both shoulder straps and waist belt together | 16.7 | 4 |
| Slinger/across chest | 8.3 | 2 |
| No preference | 4.2 | 1 |

Most convenient position to retrieving items:

| Position: | Percentage: | Quantity: |
|-------------------------------|--------------------|------------------|
| On one shoulder strap | 33.3 | 8 |
| On the chest | 29.2 | 7 |
| Placed down, on its back | 16.7 | 4 |
| Placed down, standing upright | 8.3 | 2 |
| Placed down, on its side | 8.3 | 2 |
| Reaching behind | 4.2 | 1 |

Most comfortable position for equipment safety:

| Position: | Percentage: | Quantity: |
|------------------|--------------------|------------------|
| Standing upright | 41.7 | 10 |
| On its side | 41.7 | 10 |
| On its back | 16.7 | 4 |

Are drones used in photography work?

| Yes/No: | Percentage: | Quantity: |
|-------------------------|--------------------|------------------|
| No | 45.8 | 11 |
| No, but I would like to | 29.2 | 7 |
| Yes | 25 | 6 |

What items are retrieved the most from bags?

| Item: | Percentage: | Quantity: |
|-------------------------------|--------------------|------------------|
| Lenses | 50 | 15 |
| Batteries | 23.3 | 7 |
| SD cards | 13.3 | 4 |
| Filters | 3.3 | 1 |
| Key clips | 3.3 | 1 |
| Tripod extensions/attachments | 3.3 | 1 |
| Microphone | 3.3 | 1 |

What components are desired to be removable?

| Component: | Percentage: | Quantity: |
|-------------------|--------------------|------------------|
| Internal dividers | 41.7 | 10 |
| Rain covers | 37.5 | 9 |
| Waist belt | 33.3 | 8 |
| Tripod holder | 29.2 | 7 |
| Wheels | 25 | 6 |
| None | 20.8 | 5 |

| | | |
|-------------------|------|---|
| Zips/compartments | 12.5 | 3 |
| Cushioning | 12.5 | 3 |

What is the highest price range consumers are willing to pay?

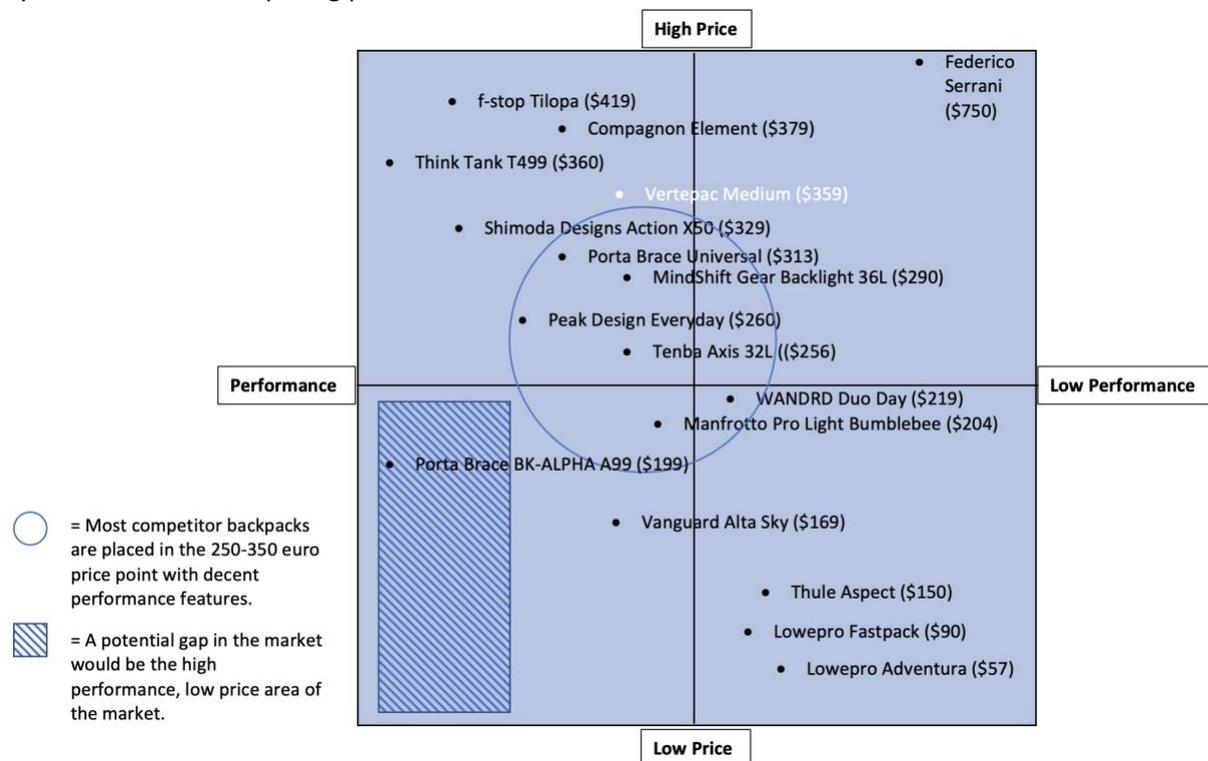
| Price range (euros): | Percentage: | Quantity: |
|-----------------------------|--------------------|------------------|
| 100-149 | 41.7 | 10 |
| <99 | 25 | 6 |
| 200-349 | 12.5 | 3 |
| 350-450 | 8.3 | 2 |
| 150-199 | 8.3 | 2 |
| >450 | 4.2 | 1 |

Appendix C - Desktop research:

C1. Competition map:

Performance: A perceptual grade based on criteria composed of functionality, amount of adjustability, weight, capacity, tailoring towards equipment and user needs.

Price: A quantifiable grade constructed from the relative pricing of their camera backpack/carrying systems to other competing products in the market.



C2. Brand trend behaviours (Last 5 years):

- 1)TARION -Search queries increased 4750% over the past 5 years.
 - 2)(Think Tank)Mindshift gear - Search queries increased 3300% over the past 5 years.
 - Lowepro Tahoe BP 150 - Search queries increased 3100% over the past 5 years.
 - 3)WANDRD - Search queries increased 1500% over the past 5 years.
 - 4)Peak design - Search queries increased 1400% over the past 5 years.
 - Manfrotto street medium - Search queries increased 900% over the past 5 years.
 - 5)Thule - Search queries increased 850% over the past 5 years.
 - 6)Brevite - Search queries increased 700% over the past 5 years.
 - 7)Fjaalraven - Search queries increased 700% over the past 5 years.
 - 8)Gimbal - Search queries increased 600% over the past 5 years.
 - 9)F-Stop - Search queries increased 200% over the past 5 years.
 - 10)Gura Gear Uinta - 170%
 - 11)Vertepac - N/A
- (Google, n.d.-a)

C3. Trend analysis:

| Factor | Trend |
|----------------------|--|
| Demographical | <ul style="list-style-type: none"> -31% of drone owners are over-55. -28% are 45-54 year olds. -12% of drone owners are 25-34. -1 in 10 18-24 year olds own a drone. -A vast majority of drone owners are male (96%). -68% of new drone users who had recently started in the last 12 months credited it to photography as the reason for taking it up as a hobby. -Older generations have more disposable income and sometimes have more free time which could be a contributing factor to the soaring popularity. (Rossi, 2020) |
| Economical | <ul style="list-style-type: none"> -Closure of portrait studios and cancellation of events means decline in revenue for the photography industry in 2020, but expected to increase 2.8% in 2021. (Global Industry Analysts, 2020) -Many photographers have little to no income this year. -12.3% industry revenue decline due to covid -0.3% industry revenue decline from 2016-2021 -Growth in total advertising expenditure, per capita disposable income leading to increased revenue during 2016-2019 -Increases in per capita income resulted in individuals and households being able to afford more family portraits and special events. -The eventual widespread administration of the covid vaccine is anticipated to enable a return to normal and aid an economic path of recovery. -Global market of digital cameras is currently \$1.4 billion, estimated to increase to \$4.6 billion by 2027. -DSLR (Digital-Single-Lens-Reflex) cameras are projected to record a 20.3% CAGR increase by 2027 and reach \$3 billion. -Bridge compact cameras to record 19.1% CAGR increase. -Growth in the compact digital camera segment is readjusted and projected to a 16.5% CAGR over the next 7 year period. (Global Industry Analysts, 2020) -The US market is projected to increase to \$363 million by 2027. -China, the world's second largest economy is forecasted to grow to a market size of \$1.1 billion at 24.7% CAGR. -Japan is projected to grow 13.7% -Canada is projected to grow 16.9% -Germany is forecasted to grow 15% CAGR. (IBISWorld, 2021) |
| Political | <ul style="list-style-type: none"> -FAA introduced new drone rules, allowing operators to fly over people and during the night. (it will require remote identification technology to pinpoint them for FAA and law enforcement) -Drones represent the fastest growing transportation sector (1.7 mil drone registrations and 203k FAA certified pilots). -UPS won first approval to operate drone delivery in Oct 2019. -Alphabet got certification for single-pilot drone operation. |

| | |
|----------------------|---|
| | <ul style="list-style-type: none"> -Amazon granted permission for delivery trials in September 2020. -Google granted approval to use drones for firefighting research this month. (Minkoff, 2021) -Photography considered 'luxury service' and nonessential therefore being negatively impacted by covid rules + regulations. (e.g. studios being closed and events being cancelled, strict social distancing guidelines.) -School portrait days, wedding, sports event and special event photography being indefinitely delayed or cancelled. (Minkoff, 2021) |
| Environmental | <ul style="list-style-type: none"> -Moving away from using chemical solutions to develop photographs. -Increased use of digital cameras meaning more use of rechargeable batteries. -Nikon decided to stop manufacturing film based cameras. -Camera film has been a potent form of pollution from the manufacturing to the processing and many manufacturers have stopped manufacturing them. -Kodak has reduced releases of Methylene Chloride from 3900 tonnes to 272 tonnes in 18 years. -Manufacturing process of making digital cameras becoming more environmentally friendly. -Packaging is becoming increasingly more recycled and environmentally friendly. -Digital cameras continue to be energy-hungry. (Hickman, 2020) |
| Social | <ul style="list-style-type: none"> -DSLR cameras are becoming more niche. -Product photographers becoming more skilled in videography. -Viewing photos on smartphones is becoming more popular, photographers must consider photos being viewed vertically and frame size. -360 degree photography has become more popular. -Rise in use of nature and landscapes in product photography. -Film photography is growing. -Decline in marriage rate potentially reducing demand for professional photography services. -More people are searching for drones. - -"Camera and lens backpack" Google search queries increased 550% in the US. (Refer to trends.google.com) -"Waterproof camera backpack" Google search queries increased 80% over the last year in the US. -"DJI Mavic Mini" Google search query has increased. (Google, n.d.-a) |
| Technological | <ul style="list-style-type: none"> -Batteries evolving and improving. -Range increasing to 100 miles -Increase in use of cloud storage. -Growing improvement of smartphone cameras potentially reducing demand for professional photography. -Drones are becoming cheaper and better. |

-Advancements in mirrorless camera technology being lighter, smaller and more compact than DSLR cameras. (Maio, 2021)

C4. Competitor product analysis:

Competitor Product Analysis

Manfrotto Pro Light Bumblebee 150

Dimensions: 30 X 19 X 51 cm
Weight: 2.65 kg

External tripod connector

Dedicated laptop compartment (15")

Breathable back + harness

Removable + interchangeable camera compartment/dividers

Compartments for 8 additional lenses

UV protection, Rain protection

Specially applied coating for moisture resistance



Think Tank T499 Airport Takeoff

Combination lock

User replaceable handles + wheels + feet

Uses 80mm wheels with sealed ABEC-grade bearings for smooth and quiet rolling

Uses high quality materials such as:
-YKKIRC Zippers
-Ballistic Nylon
-High density Velex
-Crossed-cell PU foam

Meets US domestic and international requirements for carry-on

Dimensions: 36 X 22 X 53 cm
Weight: 3.95 kg

Plush-lined pocket for smartphone or sunglasses

Retractable handle with inset channel on aluminum tubing for reinforcement

Holds 2 standard camera bodies

Reinforced dividers

Interior shape maximizes capacity



Loweprro Adventura SH 160 II

Dimensions: 24 X 16 X 18 cm
Weight: 0.4 kg

Quick-release rain flap

External camera flash compartment

Padded shoulder strap

Thick, soft dividers for cushioning

Molded base for moisture protection

Slip-in side pockets

Lightweight construction and material



Porta Brace BK-ALPHA A99

Breathable mesh back and lumbar support

Side-tripod/water bottle pocket

Padded laptop pocket

ID/business card display window

Snag-free straps fold away + can turn into slinger bag

Dimensions: 38 X 32 X 52 cm
Weight: 2.27 kg

Includes:
-Camcorder cradle
-White balance card
-Padded tablet pouch
-Camcorder belt strap
-Carabiner shackle
-7" and 4" lens cups

Durable material usage:
-Military-grade, abrasion-resistant Cordura material
-Nylon bonded fabric



C5. Product reviews:

| Vertepac and other carrying system reviews | |
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| Review | Key words |
| Vertepac | |
| "During the 700 miles Yukon river race, I have been using the Vertepac continuously to carry a load of 6 kg - a 4 liter hydration combo-blatter and some additional stuff. It allowed me to keep pushing much longer and take fewer breaks than I would have without it. So I was very happy to have it! I feel I could move my upper body so smoothly. Without feeling any restrictions, and pressure or pain on my back and shoulders. | "Continuously" - productivity "Without feeling any restrictions" - not limiting "Allowed me" - freedom "Fewer breaks" - efficiency "So smoothly" - not limiting ability |
| "I do a lot of long distance hiking, running and cycling in the UK. I decided to throw everything into the 18L bag as if I was doing the walk in winter. All my waterproofs, spear t-shirts/jackets, I even put in my big binoculars. I was so impressed that I could hardly notice that I was carrying the extra weight, and the extra weight didn't slow me down at all. I had no aches or pains in my shoulders or back." | "Throw everything" - spacious, confidence "Big binoculars" - ability to fit larger items "Hardly notice" - ease "Didn't slow me" - effectiveness "No aches" - relieving, soothing |
| "As an international mountain and ski guide I am working outdoors nearly every day. Especially on steep mountain ridges. The fact that the hip belt and the bag unit can move, turn and twist independently, offers an immense level of freedom. Also the possibility to change the different bags quickly is handy, although I usually attach the XTR.35." | "Steep mountain" - difficult landscapes, terrains "Move, turn and twist" - effortless "Different bags" - Versatility "Quickly" - trust |
| "A system which is perfect for MTB Downhill and backcountry sports where you need to have a really fast reaction. The additional spine is truly awesome; it supports the load and gives you the full range of freedom which is the key to perform in action sports. I can recommend it to any self-reliant backcountry adventurer." | "Fast reaction" - mobility "Perform" - high standard, professional "Self-reliant" - expert |
| "The weight is distributed perfectly and the load is relieved from my back. I also enjoy the freedom in the movements that the Vertepac gives you especially when skiing and snowboarding, as hip and upper body movements are crucial. " | "Distributed perfectly" - Assurance "Relieved" - Tranquility "Hip and upper body movements are crucial" - mobility |
| "The perfect bag to transport our additional luggage to our film locations in the mountains when shooting action footage. When I am off from work, I love to use it on my ski tours and mountain hikes. I hope they come up with a camera bag unit soon, I would | "Additional luggage" - spacious, transportable "Action footage" - on the move |

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| love to use it." | |
| <p>"The weight on my shoulders is gone! The comfort, after a few hours of use, was amazing. I was able to maneuver along the trails, through the timber and other vegetation with ease. For testing of the pack, I had 32 pounds (14.50 kg) of gear + the weight of the pack. After 5 hours of wearing the pack, I noted a few things. First, and to my surprise, my lower back was not hurting any more than normal. Keep in mind I just had major back surgery 8 weeks ago. I was very impressed. I also noticed that my shoulders and neck didn't have the pressure and fatigue I have experienced with other packs. My back also stayed dry despite the warm fall day. Overall the comfort of the pack is by far the best I have ever worn.</p> | <p>"Comfort" - satisfaction "Maneuver through the timber" - flexibility "Pressure" - Ease, relief "Fatigue" - active, tireless "Back stayed dry" - comfort, hospitable</p> |
| <p>"As soon as I secured the waist belt, I immediately noticed that there was little to no weight on my shoulders. The pack felt like it was floating on my back. Fairly quickly though, I realized the importance of correct adjustment as I started to have some discomfort in my left axillary area. With a few adjustments, the problem was corrected and I was on my way. The pack moved effortlessly with my body and if I hadn't have loaded it myself, I would have thought I was only carrying a couple of pounds. The waist belt remained secure and in place while the "spinal column" allowed the pack to move with my back in every stoop and bend, but at the same time, still carry the bulk of the weight. I wore it for a couple of hours and performed numerous tasks and range of motion with no fatigue, back pain, or discomfort whatsoever. I have worn many packs in my time, and this by far is the most comfortable and right up there with the best quality wise. I know there has been some concern over the price, but after wearing it, I think it is a premium product and worth the extra money. After all, how much is your back worth?"</p> | <p>"Secured" - confidence "Immediately noticed" - learning "Correct adjustment" - "Effortlessly with my body" - calmness "Secure and in place" - reliable "Stoop and bend" - active, openness "Fatigue, back pain or discomfort" - main talking points "Premium" - unique quality, design + function</p> |
| <p>"The Vertepac is by far the most comfortable pack I've used, for SAR and traditional hiking. For a typical SAR load, I carry about 35 lbs., but with the Vertepac, it felt virtually weightless. In addition to the weight-reducing suspension, the Parallel Spine system is a great feature for SAR. Since we are not usually just walking on a trail, the way the hip belt moves with you when crawling over, under and around obstacles, or through dense underbrush, it keeps the load balanced and stable. The bag itself was just about the right size for a fall/winter load out. There was plenty of room for extra clothing, rain gear, emergency shelter, etc. During the summer, I could probably get away with the XTR.18. I also like the built-in helmet carrier.</p> <p>Overall, the Vertepac is a great pack. With some minor improvements for the SAR community, it could become the gold standard for SAR packs."</p> | <p>"Weightless" - frictionless "Balanced" - doesn't affect ability "Stable" - reliable "Plenty of room" - spacious "Built-in" - resourceful</p> |
| <p>"The vertepac system is a versatile one! At first I was sceptical but it fits me surprisingly well. Active people will love this whole new</p> | <p>"Versatile" - "Fits surprisingly well" -</p> |

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| <p>concept. It makes sudden movements really easy so I could bend, dodge and evade objects easily when training on the trails with Taiga. It also rests perfect on the hips so the load distribution is optimal. It feels weird in the first couple of minutes but it really rides well on my back! I like the easy adjustments in the carry system and think it is a very good concept that one can change bags on the same system to fit different needs. Maybe the current Vertepac bags are a bit too small for long term stays in the wild and for winter camping."</p> | <p>"Active" - lots of movement "Sudden movements" - direct, not restricted "Rests" - comfort "Easy adjustments" - convenient, easy to use "Load distribution" - balanced "Change bags" - versatile</p> |
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| Factor | Review 1 | Review 2 | Review 3 | Review 4 | Review 5 | Review 6 | Review 7 | Review 8 | Review 9 | Review 10 | Quantity |
|----------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|----------|
| Flexibility/mobility: | | | | | | | | | | | 10 |
| Weight/fatigue: | | | | | | | | | | | 7 |
| Balance/composition: | | | | | | | | | | | 4 |
| Adjustability/versatility: | | | | | | | | | | | 3 |
| Room: | | | | | | | | | | | 3 |
| Reliability/confidence: | | | | | | | | | | | 3 |
| Fit: | | | | | | | | | | | 3 |
| Ease of use: | | | | | | | | | | | 2 |

Appendix D - Observational research:

User Observation at bag store:

| Observation: | What actions are they doing? | What are they struggling with/spending significant time on? | What parts did they not look at/test/try? | Main talking points/features mentioned? |
|---------------------------------|---|--|---|--|
| Customer 1 (Male, 45-55) | <ul style="list-style-type: none"> -Explained what kind of bag they're looking for -Looked at internal compartments -Read label info -Tried bag on -Feeling for any discomfort | <ul style="list-style-type: none"> -Waist strap adjustment -Reaching behind for shoulder strap- customer not flexible enough | <ul style="list-style-type: none"> -Chest buckle and strap -Internal zippers -Putting equipment inside | <ul style="list-style-type: none"> -“What material?” -“Well balanced” -“Feels rugged” -“Strong straps” -“Decent mobility” |
| Customer 2 (Male, 35-44) | <ul style="list-style-type: none"> -Seemed to know what they were looking for, quick observation and asked staff about a specific Lowepro bag -Just tried on bag, adjusted strap | <ul style="list-style-type: none"> -Waist strap adjusting | <ul style="list-style-type: none"> -Did not touch most of the bag aside from the inside and the straps | N/A |
| Customer 3 (Male, 45-55) | <ul style="list-style-type: none"> -Feeling the thickness of strap -Feeling the mesh of the back -Trying on one shoulder strap first | <ul style="list-style-type: none"> -Help with putting it on -Putting buckle on “Not sure about in the hot weather” | <ul style="list-style-type: none"> -Customer tried everything | <ul style="list-style-type: none"> “Seems quite balanced” “The waist belt does actually help a little bit” “Against my back seems quite sturdy” “The back is not digging in” “It's not heavy” |