

Audio Quality's Growing Value for Mobile Entertainment

A Parks Associates whitepaper developed for



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Executive Summary

In the increasingly competitive and maturing smartphone and tablet markets, device manufacturers and mobile carriers must constantly evaluate new features and services that can differentiate their products from the competition and enhance the consumer experience.

In recent years, manufacturers have emphasized mobile features such as screen size, internal storage, and camera resolution. This white paper evaluates audio quality's potential value as a differentiator for mobile entertainment in the smartphone and tablet markets, based on current market conditions and primary consumer data.

Parks Associates' longitudinal consumer analytics, together with findings from a conjoint study specially commissioned by Dolby Laboratories, suggest that premium audio technologies present mobile manufacturers and wireless carriers with an opportunity to enhance their mobile product portfolios and better satisfy consumer demand.

KEY QUESTIONS ADDRESSED IN THIS WHITE PAPER



How do current market conditions affect the value of premium audio technologies for mobile industry stakeholders?

Is the sound quality of the mobile entertainment experience a purchase consideration for consumers?

Do consumers prefer cinema-like sound over standard stereo sound?

How do consumers value cinema-like sound compared with other mobile device features?

What opportunities do enhanced audio experiences present to mobile device manufacturers and wireless carriers?

Survey respondents were provided an audio demonstration of Dolby Digital Plus, which is an advanced surround sound audio solution designed specifically for evolving media, to help them experience the difference between cinema-like sound and standard stereo sound on smartphones and tablets.

Market Conditions Ripe For Premium Audio on Mobile Devices

Mobile devices have enjoyed incredible growth year-over-year in all major global markets.

BY THE END OF 2013

Smartphone Adoption

78% in the U.S. 73% in Canada 68% in Western Europe

Smartphone penetration in the Asian-Pacific market will more than double in just two years, from 11% in 2011 to 24% in 2013. © Parks Associates

Tablet Adoption

OVER 1/3 of Western European households and the majority of American households will own at least one tablet

Tablet adoption has more than quadrupled in the U.S. from the iPad's introduction in 2010 to 2012.

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The rising adoption of mobile devices is enabling consumers to enjoy rich media experiences outside of the home and away from the television.

Due to advances in mobile networking technology, many consumers can now download and stream music and videos over high-speed 3G and 4G mobile broadband networks anywhere, anytime.

Additionally, storing large media files is no longer an issue. Many handsets and tablets now include microSD slots, allowing consumers to extend storage capacity locally, while an array of new personal cloud storage services offer consumers the option of storing their media files remotely.

These technological advancements and new storage services are expanding the type of media users consume on their mobile devices.



Short, user-generated video clips remain popular, but over a quarter of all U.S. consumers in broadband households watch full-length movies and TV shows on a mobile phone or tablet.

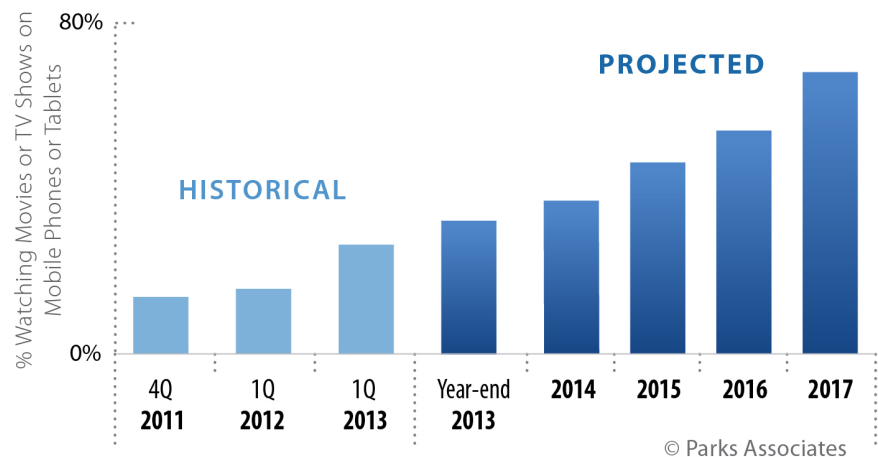
This impressive growth of premium video content on mobile devices will continue over the next five years.

Premium Video Consumption on Mobile Devices

By 2017—

68%

of U.S. consumers in broadband households will watch premium video on their mobile devices.



Handset manufacturers and wireless carriers have responded to this increase in premium video consumption by releasing devices with bigger screens and better screen resolution. Within the next few handset development cycles, manufacturers may consider adding cinema-like sound as a way to cater to these consumer media consumption trends as well.

Furthermore, current market conditions are improving the value proposition of premium audio for device manufacturers. The mobile device market is maturing, and differentiation between device models becoming more difficult.

Most smartphone models now meet consumers' basic needs...

- ✓ 1. Large and responsive touchscreens
- ✓ 2. Access to the Internet
- ✓ 3. Access to a wide variety of apps
- ✓ 4. Decent digital camera
- ✓ 5. GPS

Manufacturers, mobile operators, and other retailers must now develop and promote devices with a "second wave" of features and functionality that can differentiate their mobile devices from competitors' while also designating "premium" smartphone and tablet models from basic models within their own mobile device portfolios.

Some device manufacturers and content distributors have already identified premium audio as a second-wave feature that can provide that differentiation.

Mobile handset manufacturer HTC, for instance, recently released new handset models with Beats™ Audio to enhance its brand appeal to music lovers. The manufacturer has also moved the speakers on some models from the back of the device to the front, for a better sound experience.

On the tablet side, Samsung recently released the new Samsung Galaxy Tab 3 series with the support of Dolby Digital Plus to enrich its entertainment experiences. Additionally, Amazon incorporated Dolby Digital Plus technology into its Kindle Fire HD tablets to provide consumers an optimal audio experience for entertainment.

SK Telecom's application and digital media store, SK Planet, now streams and plays back downloaded movies and TV shows in Dolby Digital Plus.

Consumers Value Audio Quality On Mobile Devices

While market conditions are ripening, mobile industry players remain unclear about how consumers prioritize audio quality in relation to other smartphone and tablet features.

To test the value of a cinema-quality sound experience for entertainment consumption on mobile devices, Dolby commissioned Parks Associates to develop, field and analyze surveys of consumers in the U.S., France, Germany, China and South Korea.

The surveys were fielded in the first quarter of 2013 to 1,000 smartphone and tablet owners, ages 18 and older, in each country.

% of Smartphone Owners

Unsatisfied or Moderately Satisfied with the Audio Quality for entertainment on their Mobile Devices*

69%	South Korea	44%	China
60%	France	42%	U.S.
57%	Germany	*Rating <8 on 10-pt. Scale	

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The data indicate that current device offerings are not meeting many consumers' needs.

This means that the majority of consumers in some markets (France, Germany, and South Korea) are only moderately satisfied—or unsatisfied—with their mobile audio experience.

These widely ranging figures indicate either a very inconsistent sound experience across current mobile devices or that consumers simply have no standard against which to judge the quality of their mobile sound experience for entertainment. Either way, there is clear room for improvement.



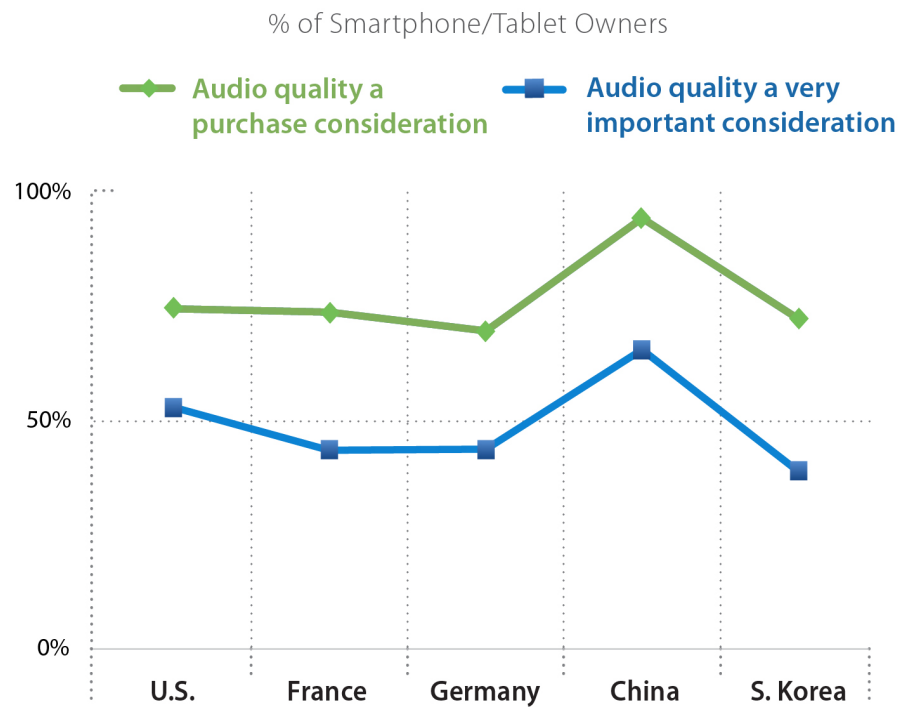
Consumers report considering audio quality when purchasing mobile devices.

In all five markets, over 66% of mobile device owners indicated that audio quality is a purchase consideration when shopping for smartphones and tablets.

50% of consumers in the U.S. and nearly 70% in China further indicated that audio quality is a very important purchase consideration.

About 40% rate audio quality very important in France, Germany and Korea.

Importance of Audio Quality for Mobile Devices

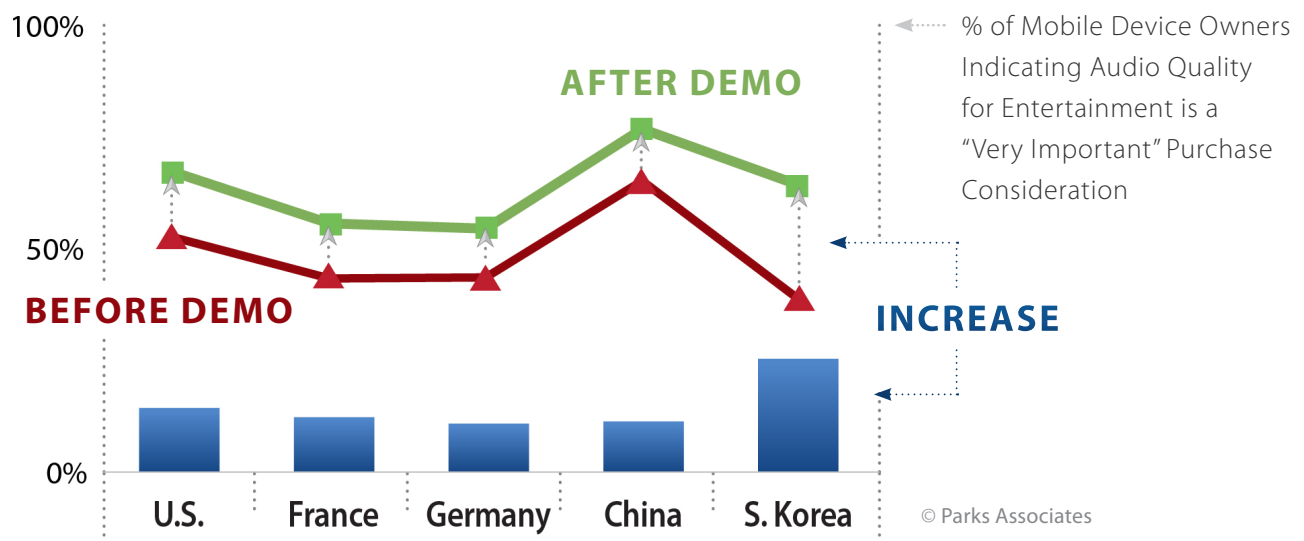


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When consumers are able to hear for themselves the difference between standard stereo and cinema-like audio—that is, when consumers have a standard to judge against—audio quality becomes even more important to consumers' shopping process.

After listening to audio demonstrations with and without Dolby Digital Plus technology—through which respondents could perceive a clearer, high-fidelity and surround sound experience with Dolby Digital Plus turned on—respondents' indication of the importance of audio quality for entertainment as a key purchase decision for mobile devices increased significantly.

Impact of Dolby Digital Plus Demo on Importance of Audio Quality as a Purchase Consideration



U.S. Respondents

67% of U.S. respondents rated audio quality as a "very important" purchase consideration after the demonstration, compared with 53% before.

53%
BEFORE

demo

67%
AFTER

© Parks Associates

The lift was even greater in South Korea

64% of South Korea respondents rated audio quality as being "very important" after the demonstration, compared with only 39% before.

39%
BEFORE

demo

64%
AFTER

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Simulated Mobile Purchasing Decisions

After listening to the audio demonstration, respondents were presented with a simulated shopping experience based on a choice-based conjoint survey design.¹ This survey modeling quantifies how consumers value audio quality in relation to other mobile device features. Each respondent was asked to select from a series of smartphone and tablet packages that varied around several features, including price point.²

Smartphone Feature Choices

- Brand/OS
- User input interface
- Display screen size
- Mobile network option
- Camera resolution
- Audio quality for music and other entertainment
- Price



Tablet Feature Choices

- Brand/OS
- Display screen size
- Wireless network option
- Internal storage
- Audio quality for music and other entertainment
- Price

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Consumers were asked to choose one of three smartphone models four times, and to choose one of three tablet models four times, for a total of eight purchase decisions. The following is an example of one three-model set from which a respondent would be required to choose one model.

Smartphone Model A

Apple/iOS

- Touch screen
- 3.5-inch screen
- 3G Network
- 5-megapixel camera
- Cinema-like Stereo 5.1ch
- \$199.99

VS.

Smartphone Model B

Samsung/Android

- Touch screen
- 4-inch screen
- 3G Network
- 3-megapixel camera
- Standard Stereo 2.1ch
- \$149.99

VS.

Smartphone Model C

Blackberry

- Qwerty Keyboard
- 4.5-inch screen
- 3G/4G Network
- 8-megapixel camera
- Standard Stereo 2.1ch
- \$179.99

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By combining all of the 8,000 product choices made by the survey respondents in each country, and comparing these product packages with those not selected, Parks Associates analysts could statistically infer which features respondents valued more highly relative to the other features, and to what degree.

¹ See Appendix A for more details on choice-based conjoint survey testing and methodology.

² See Appendix B for a full list of product features and pricing levels tested for each market.

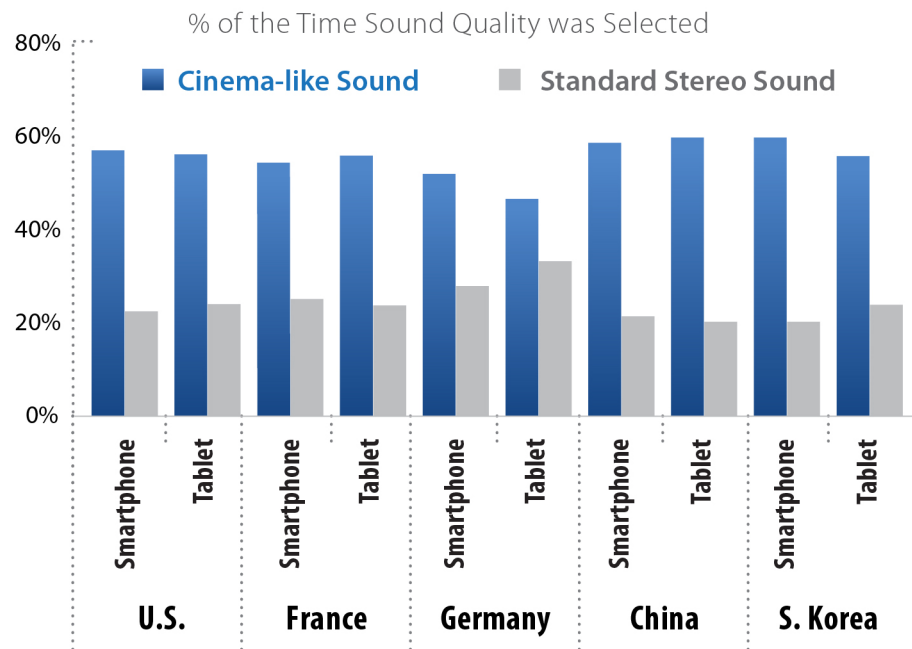
According to the Conjoint Survey Results

Consumers show a clear preference for cinema-like sound quality over standard stereo sound at a 2-to-1 ratio in most markets tested.

Even though both levels of sound quality were presented to respondents at an equal proportion, and thus had an equal chance (50/50) of being chosen, respondents in all five markets selected a model with cinema-level sound quality over ones with standard stereo sound quality more often than not.

In four out of the five markets, cinema-like sound was chosen over standard stereo sound at least 60% of the time for both smartphones and tablets.

Consumer Preferences for Cinema-like Sound over Standard Stereo Sound



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Impact of Cinema-like Sound on Price Points

Not only did respondents choose devices with cinema-like sound more often than devices with standard stereo sound, but they also chose devices with cinema-like sound at higher prices than the same models with standard stereo sound.

Within the shopping simulation scenario, consumers in all five markets showed a purchase pattern that implied their willingness to pay a higher price for devices that offered cinema-quality audio.

Depending on the particular brand/model tested, U.S. respondents selected smartphones with cinema-like sound quality at implied prices that were \$20 to \$50 higher than the same models with standard stereo sound. The same pattern held for tablets; U.S. respondents in the simulated shopping scenario “paid” on average an extra \$30 for tablet models with cinema-quality sound. The data revealed similar purchasing patterns in Europe, where respondents “paid” €30-€40 more for a smartphone and €20-€25 more for a tablet with cinema-quality sound.

Value of Cinema-like Sound on Mobile Devices



Smartphone	\$20-\$50	€30-€40	€30-€40	¥250-¥500	₩50,000-₩100,000
Tablet	\$30-\$35	€20-€25	€20-€25	¥200-¥250	₩40,000-₩50,000

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Value of Audio Quality among Mobile Features

Relative to other features tested in the simulated shopping experience, audio quality ranked within the top four smartphones features in all five markets.

In the U.S., France, and Germany, audio quality ranked below brand and price but above features like screen size, user input interface (touch screen or QWERTY keyboard), and mobile network choice (3G or 3G/4G mobile network). In China and Korea, sound quality ranked only below brand/OS.³

³ Chinese respondents were less price-sensitive than respondents in other markets. This is likely due to the fact that the survey was restricted to smartphone and tablet owners; since smartphone and tablet adoption is lower in China, these survey respondents are more likely than the average population to come from high-income households (and thus are less price sensitive).

Relative Importance of Smartphone Features



Top Feature	Brand/OS 22.6%	Price 22.8%	Brand/OS 28.1%	Brand/OS 26.7%	Brand/OS 26.6%
#2 Feature	Price 21.4%	Brand/OS 21.4%	Price 24.0%	Audio Quality 25.2%	Audio Quality 18.8%
#3 Feature	Audio Quality 19.2%	Camera Resolution 16.4%	Camera Resolution 14.0%	Camera Resolution 17.5%	Mobile Network 14.4%
#4 Feature	Camera Resolution 14.8%	Audio Quality 14.3%	Audio Quality 13.5%	Price 10.9%	Price 14.1%
#5 Feature	Screen Size 9.5%	Screen Size 10.4%	Screen Size 10.3%	Screen Size 10.1%	Camera Resolution 13.0%
#6 Feature	Mobile Network 8.6%	Input Interface 8.0%	Input Interface 6.8%	Input Interface 6.3%	Screen Size 10.6%
#7 Feature	Input Interface 3.9%	Mobile Network 6.7%	Mobile Network 3.3%	Mobile Network 3.4%	Input Interface 2.4%
Choice Total	100%	100%	100%	100%	100%

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The survey results also illustrate how important consumers find each mobile device feature relative to the other features tested.

If all seven smartphone features together account for the full purchase decision a consumer makes in the simulated shopping scenario, audio quality would account for nearly a fifth of a U.S. shoppers' mobile device choice.



In the U.S., since screen size accounted for 9.5% of a U.S. shopper's device choice and audio quality accounted for 19.2%, audio quality is roughly twice as important to the U.S. consumer as screen size.

In France, audio quality is twice as important as mobile network choice.

In Germany, audio quality is comparable in importance to camera resolution.

In China, respondents considered audio quality to be nearly as important as the top smartphone feature, brand.






Audio quality was even more important for simulated tablet purchases, ranking within the top three tablet features in all five markets.

After price, audio quality ranked second for both U.S. and French tablet shoppers and was about as important as brand/OS and amount of internal storage. For German consumers, audio quality on tablets is about as important as screen size, but significantly less important than brand/OS.

Chinese consumers place the highest relative importance on audio quality, which is roughly comparable to the importance they place on brand/OS.



Relative Importance of Tablet Features

					
Top Feature	Price 36.0%	Price 33.5%	Price 39.8%	Audio Quality 28.0%	Brand/OS 27.4%
#2 Feature	Audio Quality 16.2%	Audio Quality 16.3%	Brand/OS 20.1%	Brand/OS 27.4%	Internal Storage 17.7%
#3 Feature	Brand/OS 15.5%	Internal Storage 15.3%	Audio Quality 12.3%	Price 15.5%	Audio Quality 16.3%
#4 Feature	Internal Storage 14.3%	Brand/OS 14.8%	Screen Size 11.4%	Internal Storage 13.5%	Wireless Network 15.3%
#5 Feature	Wireless Network 10.4%	Screen Size 12.3%	Internal Storage 9.4%	Wireless Network 9.5%	Price 14.9%
#6 Feature	Screen Size 7.5%	Wireless Network 7.9%	Wireless Network 6.9%	Screen Size 6.2%	Screen Size 8.4%
Choice Total	100%	100%	100%	100%	100%

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The relative importance of cinema-like sound varied depending on brand.

Those manufacturers with lower market share enjoyed a greater boost in demand than did manufacturers with greater market share. BlackBerry benefited more from incorporating enhanced audio than did Apple or Samsung in the U.S. and French markets; in China, optimized audio was particularly important for CoolPad and ZTE.

On the tablet side, Acer, Asus and Sony all received much larger lifts in Korea from cinema-like audio quality than did either Apple or Samsung.

Still, all smartphone and tablet brands saw a considerable increase in simulated purchases when cinema-like sound was incorporated into the mobile device specs.

Opportunities for Industry Stakeholders

Mobile handset and tablet manufacturers have a clear opportunity to address the current suboptimal mobile audio experience reported by many consumers across global markets.

Distinct Opportunities



Improve consumer experience. Smartphone and tablet owners are increasingly consuming games, music, movies and TV shows on their mobile devices. Manufacturers and wireless carriers can improve the consumer experience by incorporating enhanced audio technologies, while marketing the technology as a premium entertainment feature.



Prioritize cinema-quality sound over other device features. Consumer desire for premium audio is in line with, if not greater than, other hardware features, such as camera resolution, amount of internal storage and screen size. Manufacturers should consider prioritizing cinema-quality sound over other device features, especially for those models positioned as entertainment consumption platforms.



Boost sales and justify higher device pricing. The survey results demonstrate that manufacturers and retailers can expect a lift in sales of devices with cinema-like sound over those with standard stereo sound. While the incorporation of premium audio technology necessitates new costs, these findings indicate consumers will tolerate higher pricing for a better sound experience. Alternatively, manufacturers may opt to pass the savings to consumers without increasing the price and instead gain from higher market shares.



Improve brand share and reputation. Manufacturers with low market share will benefit disproportionately from highlighting enhanced audio as a premium feature, especially while incorporation of premium audio technology remains a novel feature. That said, all brands saw a substantial lift in simulated device purchases with the cinema-like sound, even those with the greatest share in each market tested.



Offer demonstrations to showcase audio experience. Audio demonstrations will be important to maximize latent consumer demand for better audio quality on mobile devices. Handset manufacturers can provide on/off audio demonstrations online, while mobile carriers and other retailers can provide customers with in-store audio experiences.



Understand market variations. Industry players should note the nuances in the ways consumers in different markets valued a premium mobile audio experience for entertainment consumption.

Current smartphone owners in China are enthusiastic for premium audio technology across the board. Consumers in South Korea are particularly swayed by audio demonstrations highlighting the difference between cinema-like and standard stereo sound. Consumers in France and Germany consider audio quality to be about as important as camera resolution. The value U.S. consumers assign to premium sound varies depending on brand.

Attention to market differences will result in better product development decisions and more tailored product messaging.

Parks Associates' data suggest that with the added boost of a first-hand experience of the difference between cinema-like sound and standard stereo sound, enhanced audio technologies will result in greater consumer satisfaction and also better mobile device revenues across the value chain.

APPENDIX A: Choice-based Conjoint Survey Model

What is Conjoint Analysis?

Conjoint analysis is a statistical tool used to understand consumer preferences for product and service features. Unlike standard surveys that ask consumers directly about their preferences for product features, a conjoint design measures consumer preferences by assigning features a “utility” value based on the number of times the feature was chosen as part of a product package “purchased” by the respondent—the higher the utility, the higher in general the preference for that feature.

Marketers can use the utility value of each feature to build different product concepts. They can “simulate” a market condition to understand how consumer preferences change when different product features are added, subtracted, or switched. There are several flavors of conjoint design, but the Parks Associates survey commissioned by Dolby used a choice-based conjoint model.

Why use Choice-Based Conjoint Analysis?

Choice-based conjoint design closely mimics what consumers do in a real-world shopping environment; by analyzing what consumers choose and do not choose, marketers can understand consumer preference for features and how they make “trade-off” decisions when buying a product—“should I buy an Apple iPhone at a higher price or a Samsung phone with a lower price but larger screen?”

Choice-based conjoint design is best suited for pricing research. Price is usually the most important factor in consumer purchase decisions and actual device prices are influenced by the features included in each product model (premium features drive up the device price). Other conjoint designs do not capture this interaction between price and other product features.

How does a Choice-Based Conjoint model differ from a real shopping scenario?

All conjoint results should be interpreted within the simulated purchase environment. While the conjoint testing model provides significant insight into the product features consumers value relative to other product features, a conjoint survey differs from a real shopping scenario in several ways:

- In a real shopping scenario, consumers would consider more features than just those tested. For instance, some consumers may consider a mobile device’s color, weight, screen resolution, or the availability of accessories. It is not possible to test all potential purchase considerations in a conjoint model. The features tested in this survey were determined by Parks Associates analysts, based on previous research, to be those that consumers understand and are able to compare and contrast, and those most likely to account for the bulk of a consumers’ purchase decision.
- In a real shopping scenario, consumers are not forced to make a purchase decision; that is, they can always walk away and buy nothing. To better enable insight into the relative importance of model features, this conjoint survey forced respondents to pick one of the models as “the most likely option” presented to them, without having the option to choose “none of the above”.
- In a real shopping scenario, consumers may or may not be provided a demonstration of the difference between cinema-quality versus standard mobile audio in stereo. The results of this survey show that the Dolby Digital Plus demonstration had a significant impact on respondents’ assessment of the importance of audio quality on mobile purchasing decisions. Therefore, the results of the conjoint portion of the survey must also be assumed to have been affected by the audio demonstration. Retailers that employ audio demonstrations are more likely to see purchasing results similar to the results of this survey than those not offering audio demonstrations.

Device Features, Brands, and Pricing Tested in Conjoint Model

Device Features Tested in Conjoint Model

Smartphones

User Input Interface	Screen Size	Mobile Network Type	Camera Megapixels	Audio Quality
QWERTY Keyboard	3.5"	3G	3 Megapixel	Standard Stereo 2.1ch
Touch screen	4"	4G/LTE	5 Megapixel	Cinema-like Sound 5.1ch
	4.5"		8 Megapixel	
	5"		12 Megapixel	

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Tablets

	Screen Size	Wireless Network Type	Internal Storage	Audio Quality
	7"	Wi-Fi Only	8 GB	Standard Stereo 2.1ch
	8"	Wi-Fi + 3G/4G	16 GB	Cinema-like Sound 5.1ch
	9"		32 GB	
	10"		64 GB	

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Brands/OS Tested in Conjoint Model

Smartphones

United States	France	Germany	China	South Korea
Apple	Apple	Apple	Apple	Apple
Blackberry	Blackberry	Blackberry	CoolPad	LG
HTC/Android	HTC/Android	HTC/Android	Huawei	Motorola
Motorola	Nokia	Nokia	Lenovo/Android	Pantech/Android
Nokia	Samsung/Android	Samsung/Android	Samsung/Android	Samsung/Android
Samsung/Android	Sony	Sony	ZTE	Sky/Android

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Tablets

United States	France	Germany	China	South Korea
Acer/Android	Amazon Kindle Fire	Acer/Android	Apple iPad	Acer/Android
Amazon Kindle Fire	Apple iPad	Amazon Kindle Fire	eRen eBen/Android	Apple iPad
Apple iPad	Archos	Apple iPad	Huawei	Asus/Android
Lenovo/Windows	Asus/Android	Asus/Android	Lenovo/Android	LG
Microsoft Surface	Samsung/Android	Huawei	Samsung/Android	Samsung/Android
Samsung/Android	Sony/Android	Samsung/Android	TEcLast/Android	Sony

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Price Points Tested in Conjoint Model

Smartphones (Retail pricing in China; pricing after carrier subsidy in all other markets)

United States	France	Germany	China	South Korea
\$99.99	€ 99.95	€ 99.95	¥1,000	₩400,000
\$129.99	€ 129.95	€ 129.95	¥1,500	₩450,000
\$149.99	€ 149.95	€ 149.95	¥2,000	₩500,000
\$179.99	€ 179.95	€ 179.95	¥2,500	₩550,000
\$199.99	€ 199.95	€ 199.95	¥3,000	₩600,000
\$229.99	€ 229.95	€ 229.95	¥3,500	₩700,000

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Tablets (Retail pricing)

United States	France	Germany	China	South Korea
\$199.99	€ 159.95	€ 159.95	¥1,500	₩299,000
\$229.99	€ 199.95	€ 199.95	¥2,000	₩399,000
\$259.99	€ 249.95	€ 249.95	¥2,500	₩449,000
\$289.99	€ 329.95	€ 329.95	¥3,000	₩499,000
\$329.99	€ 379.95	€ 379.95	¥3,500	₩549,000
\$449.99	€ 449.95	€ 449.95	¥4,000	₩599,000

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Research Sources

- Parks Associates' *Global Digital Living Forecast Workbook*, February 2013: provides projections for the growth of major digital living platforms and services.
- Parks Associates' *Video on Demand: The Road to Revenues*, May 2013: analyzes consumer video consumption across platforms, the market for video on demand, and how content and service providers can increase VOD revenues. Based on a survey of 10,000 broadband Internet heads-of-households ages 18 and older in the U.S.
- Parks Associates' custom consumer analytics report, commissioned by Dolby: survey analyzed consumer perception of audio quality on mobile devices and tested the relative importance of audio quality compared with other mobile device features using a choice-based conjoint design. Online surveys of 1,000 smartphone owners ages 18 and older were fielded in the first quarter of 2013 in each of five markets: the United States, France, Germany, China and South Korea.

About Dolby



Dolby Laboratories is the global leader in technologies that are essential elements in the best entertainment experiences. Founded in 1965 and best known for high-quality audio and surround sound in environments from the cinema to the living room to mobile devices, Dolby creates innovations that enrich entertainment at the movies, at home, or on the go.

Designed for today's multiscreen world, Dolby Digital Plus elevates sensational sound to a whole new level, enabling OEMs, Operators and OTT providers to deliver superior entertainment experiences through each stage of the value chain. Dolby works with manufacturers to custom-tune each mobile device to ensure that consumers can enjoy a high-quality audio experience no matter where they are.

www.dolby.com

About Parks Associates



Parks Associates is an internationally recognized market research and consulting company specializing in emerging consumer technology products and services. Founded in 1986, Parks Associates creates research capital for companies ranging from Fortune 500 to small start-ups through market reports, primary studies, consumer research, custom research, workshops, executive conferences, and annual service subscriptions.

The company's expertise includes new media, digital entertainment and gaming, home networks, Internet and television services, digital health, mobile applications and services, consumer electronics, energy management, and home control systems and security.

www.parksassociates.com | 972.490.1113 | info@parksassociates.com

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