

# A Study of Impact of Responsive Web Design in E-commerce Websites

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**Abstract:** Current age is an age of e-commerce, every business wants to become online, as customers are preferring online purchasing and online product information. we cannot be sure which platform a user will be using for browsing e-commerce website. There are different platforms to browse internet ranging from PC, notebook, tablet, iPhone, iPad to mobile phones. Recently, mobile device and computer screen designers have been trying to provide users with qualified web-browsing but this hasn't been able to afford adequately users' needs that are exposed to traditional website layouts. we believe that it is also important to explore and discuss how to provide a fluent and consistent user experience for the same webpage across various devices.

Therefore, there is a need to switch to Responsive Web Design which is capable of reshaping itself depending on various screen sizes and resolutions from largest screen sizes to smallest on mobile devices. In this paper, the authors will explore how to improve user experience fluency for the same webpage across various devices with responsive web design.

**Keywords:** Responsive Web Design, e-commerce, Features of Responsive Web Design.

## I. INTRODUCTION

In the upcoming years, e-commerce is expected to boom in the Asian region. The number of digital buyers in Asia Pacific is projected to pass the one billion mark for the first time in 2018, which will account for 60 percent of all internet users in the region. In line with the regional growth, India, a fast-growing emerging Asian market, shows optimistic projections for the e-commerce industry. Current active e-commerce penetration in India stands only 28 percent, with lots of room for improvement - India's retail e-commerce CAGR is projected to reach 23 percent from 2016 to 2021.

Close to 329.1 million people are projected to buy goods and services online in India by 2020. This means that about 70.7 percent of internet users in India will have purchased products online by them. The majority of digital shoppers in India are male. This growth in volume of digital buyers has a reflection on revenue as well. Retail e-commerce sales in India are forecast to grow tremendously, with projections to jump from around 16 billion U.S. dollars in 2016 to just over 45 billion U.S. dollars in 2021. In 2016, Amazon.in was the leading online store in India with net e-commerce sales of 437.7 billion U.S. dollars, followed by local competitors Flipcart and Snapdeal.

Mobile is also a profitable and promising shopping platform for the retail industry in India. In fact, about 23 percent of Indian internet users stated that they used a mobile phone for making a purchase in 2016. This places India as one of the leading digital markets for mobile e-commerce penetration. About 27 percent of digital buyers in the country stated making an online purchase via their smart phones/mobile on a monthly basis, and 24 percent stated purchasing online goods and services weekly. About 71 percent of consumers in India also said mobile wallet is their preferred method of digital payment. In terms of value, sales from mobile retail e-commerce are projected to generate 63.5 billion U.S. dollars in revenue by 2020.

This statistic gives information on the digital buyer penetration in India from 2014 to 2020. In 2016, 43.8 percent of internet users in India had purchased products online. In 2019, this figure is expected to grow to 64.4 percent.

## II. WHY RESPONSIVE WEB DESIGN

With the invention of more and more new technologies and new gadgets the customers want to use the best and newest gadgets for them. In past, it was only desktop computer which everyone used. So it was not important for the designers to work on the responsive web design. Then laptops came, then tablets and so on.

The real fact is that people in this modern era want to browse web easily and quickly. This means that responsive web design is made to help the users browse with any type of device they have in their hands. Web designers have to design such website which gives the information in different screen sizes and different screen resolutions to the users. Your website should be so versatile that it can be used on a mobile phone or on a huge sized LCD screen.

Before responsive web design, the designers had to design a lot of versions of their website which was really tough but that was the only solution. But this solution didn't work as users needed to download too many designs and extra code. And all this ended up with a bad user journey.

This is the main reason why responsive web design gained popularity and importance. RWD is very helpful for us in meeting all of these requirements and allowing us not to work hard in making a lot of designs of a single website for different devices.

Responsive web design is very important from a business point of view too. It allows the users visit your website from any device they have. This increases the traffic on your website.

### What is Responsive Web Design

Responsive web design is the technique of building a website suitable to work on different types of devices with different screen size like PC, notebook, tablet, an iPhone, iPad to simple Java-enabled mobile phones. Responsive web design is focused around providing an intuitive and gratifying experience for everyone. The responsive web design term itself was coined, and largely developed, by Ethan Marcotte.



Essentially, a responsive site provides a dynamic layout and sometimes content or functionality to fit the screen and context of visitors. This is more than just hiding content for the mobile experience. This is fundamentally different than earlier liquid designs. Those designs were coded using flexible elements that could resize the content as the user changed the size of their browser window. However, they could not query the device. Responsive sites use CSS3 media queries to determine the screen size and then call different rules to change the layout in order to optimize for each screen size.

An easy way to comply with the conference paper formatting requirements is to use this document as a template and simply type your text into it.

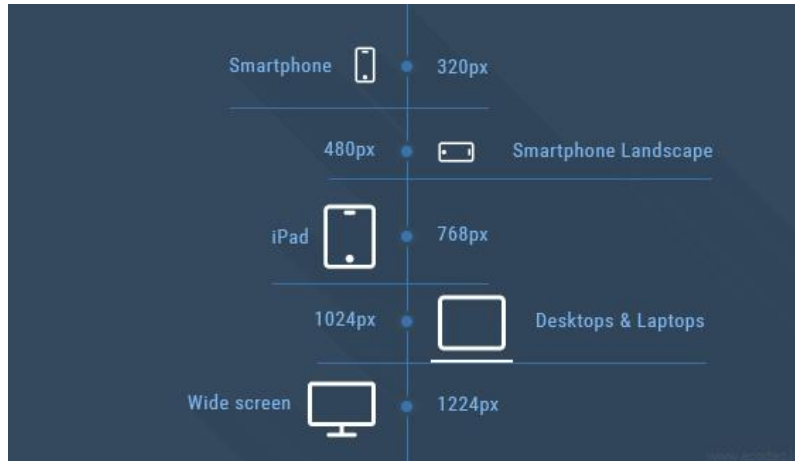
## III. FEATURES OF THE RESPONSIVE WEBSITE DESIGN

### A. Custom Layout Structure



From a technology standpoint, the framework consists of a combination of flexible grids, flexible layouts, images and intelligent use of CSS media queries. As the user switches from one device to another (for example, desktop to iPhone), the website automatically adapts to accommodate for resolution, image size and scripting abilities. This eliminates the need for resizing, panning and scrolling by the user in order to view the website on the new device.

## B. Adjusting Screen Resolution



Now a days, new gadgets with new screen sizes are coming into the market with landscape and portrait designs. Modern devices such as iPad, iPhone, Android Phones, Windows phones, Smartphone have the capability to switch from portrait to landscape automatically according to user's preference. But, did someone ever think about what's happening behind the scene while switching a design from portrait to landscape? Also, lots of new devices are coming out daily. It's a fact that we can't keep creating custom resolutions for each one. So, how do developers deal with this situation?

Since entirely new layout rules are applied at critical screen size and resolution breakpoints, it is possible to tailor one site to suit the desktop, tablet, and mobile experiences. These breakpoints are the predetermined size at which new layout rules are applied. For instance, sites may be laid out very differently for devices with a screen width of 320 pixels, as opposed to a width of 1200 pixels.

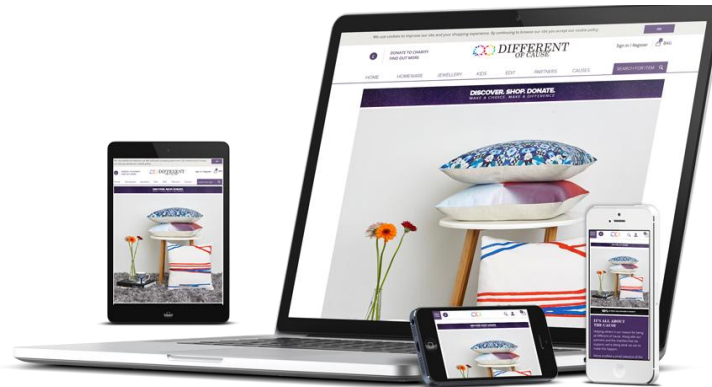
Common Resolution	Breakpoints Type of Device
320 px	Mobile devices in portrait mode
480 px	Mobile devices in landscape mode
600 px	Tablets in portrait mode
768 px	Tablets in landscape mode
1024px	iPad 1 and 2 in landscape, as well as desktop.
(iPad 3 is 2048 x 1080)	
1200 px	Large desktop displays

## C. Website Flexibility



It is not just the layout and text that has to be flexible, the entire website content should be flexible. Now we have enough technology and tools to make it happen. Fluid grids, layouts and fluid images are the techniques that can be followed to make a website flexible on all platforms.

#### D. Responsive Images



This is the process of shrinking the images in smaller devices proportionally. This method ensures that large images do not waste space unnecessarily on small screens. The main difference between this snippet and the specification is the removal of a fallback src attribute, which was intentionally taken out to prevent images from being downloaded twice in unsupported browsers. The sizes attribute tells the browser of the image's size relative to the viewport. There are ways with which responsive images can be implemented like Device-pixel-ratio-based selection, Viewport-based selection, Art direction-based selection and Image format-based selection

#### E. Perfection in Your SEO

The websites without responsive design are usually not compatible for smart phones and all other devices. For such devices the companies have to build 'mobile sites'. These things not only double the work of developers, but also create a challenge for SEO persons to optimize the links of both mobile & desktop sites. Responsive designs of the website give easier for SEO's persons to work only once & limited the burden of work.

These features provide the ease of optimizes the site against one link. One URL optimizations are very easy that give consistency in URL structure against all devices. This will eventually outcome higher performance rate of your website that make it more popular among the rest of the search results.

### IV. BENEFITS OFFERED BY RESPONSIVE WEB DESIGN IN E-COMMERCE

**Broader Audience and More Customers :** Since responsive designing makes an ecommerce site compatible for multiple devices, it makes your site universally accessible, helping you to reach broader audience. In addition to this, the clear and simple content hierarchy driven by responsive web design helps your customers to navigate your site smoothly and view products properly even on smaller screens, thereby increasing satisfaction among visitors and motivating them to turn into loyal customers.

**Increasing website reach to all devices:** This is one of the most beneficial aspects of Responsive Websites Designs that they provide lovely user-experience across many devices neglecting their screen sizes. Their flexibility to adapt the screen resolution of all devices makes it more appealing. You can imagine your site as effortlessly working for all devices that gives most firm positive user experience. The optimization of your site to all available screens size gives a remarkable universal look. Increasing use of the internet and proliferation of web applications on tablet and mobile devices has been the driving force behind this development. Traditionally users would be re-directed to a device specific site (e.g. mobile), but responsive design means one site can be implemented across devices.

**Increase sale :** A full-fledged responsive ecommerce site is still considered as an exception since many online retailers are still refraining from responsive designing. So Developing ecommerce site responsive will give you a competitive edge, enable your consumers to view products clearly and will allow them to purchase products easily, thus boosting your sales. In fact, several reputed brands have found that having a responsive site has helped them to increase their conversion rate around 20%.

**Consolidate your analytics and reporting :** A single responsive site means that you no longer have to track user journeys, conversion paths, funnels and redirections between your sites. Site analytics tools like Google Analytics are now

optimised to handle multiple devices and responsive reporting. All of your tracking and analytics will continue to function and be condensed into a single report, allowing for easier monitoring and analysis.

**Maintain Site Speed:** An ecommerce site includes lots of types of content, including product images of large sizes. Loading images won't be problem in desktop, but large images can certainly slow down a site's speed in smartphones. Speed matters a lot to visitors as research has showed that if your site takes more than 5 seconds to load, then visitors are likely to leave it immediately.

In responsive designing, designers use techniques that can reshape images to an appropriate size based on screen size, thus helping your ecommerce site to maintain its speed. Lazy loading ensures that only a small portion of the images are loaded in one go; more images load as the user scrolls.

**Gives Open Support For All Browsers:** The Responsive Websites Designs are more compatible with all search engines. Which is the most important & beneficial feature of responsive websites. As we know *Greater the compatibility of a website to search engines greater its visibility*. Visibility features eventually provide the ease of accessibly acquired websites on all devices. These visibilities will attract more users to your site that raises your income graph.

**Provides control and flexibility** – changes can be made at one centralized place. You do not need to contact multiple vendors to make changes when your mobile site/ mobile application is built by different development companies.

**Increase Website visibility in search engines:** Responsive Design can manage one website with a single set of hypertext links; therefore reducing the time spent maintaining your site. This allows you to focus on link outreach with a consolidated Search Engine Optimisation (SEO) strategy. SEO campaigns can be time consuming and costly, but by creating a responsive site, all of your efforts can be focused on a single site, with unified strategy and tactics across devices. Content is vital in SEO, good quality content which is regularly released improves your search engine ranking page positioning, therefore a further advantage of responsive design is that fewer resources can be wasted in low-level duplication of content across sites, the content need only be applied to a single site, increasing your chances or a higher search engine ranking. Additionally Google suggest (which Byte9 analytics can confirm) that mobile optimised, responsive sites are featuring prominently in localised search results. This is obviously of huge significance to high street and online retailers, amongst other burgeoning mobile use cases.

**Save time and cost on site management :**A primary benefit of adopting a responsive design is that it takes less time than creating an additional stand-alone mobile site, which has been the traditional approach. Testing across a number of websites also increases your development, support and maintenance overhead. As styles are re-used and optimised by device standardised testing methodologies can also be used.

Clients will also find it much easier and less time consuming to manage and maintain a single site, with much less content to manage. Additionally a single administrative interface can easily be optimised, using layout and workflow tools to manage the correct content, or site templates that are being used for different devices. Business logic can be applied such that the overall multi-device experience can be significantly enhanced within a single administration.

**Low Cost & Ease of Maintenance :**It is the most important feature of RWD **Websites, Games Apps** for budget conscious customers. Instead of developing different versions of a single site that will compatible against desktop, laptop, iPods and smart phones you just need to develop a single site with responsive characteristics.

This will eventually minimize the cost factor and give ease of maintenance. In long term flawless flow of your website makes it resistant of unseen defects. It will lower the burden of maintenance in a cost effective manner.

Enhance user's offline browsing experience : Responsive design allows site owners to deliver quality content to audiences across devices, the offline browsing capabilities of HTML5 mean that sites can be easily accessed 'on the go'. As HTML5 enabled tablets and smart phones proliferate this will become increasingly important. Email newsletters, and content contained in hybrid HTML5 web applications will increasingly be consumed on the move and in the absence of an internet connection.

**Social sharing :**When someone on a desktop computer shares the links on social networking site, other person who browses the website cannot open that in a mobile device usually. But in the responsive web design, you never face this problem; you can easily open the link in your mobile and can share the same on social networking sites.



## Disadvantages of Responsive Web Design

**Complexity** :RWD as an approach can be quite a complex process if not handled with thorough planning and some creative designing. Web developers and business owners need to be very clear about what they want the users to see on their websites, when viewed through a desktop or a tablet or a smart phone. Some features that look great on desktop might not work on other devices. The design should be carried out in such a way that the website looks and feels great on every platform. All these views greatly increase the complexity of creating a responsive website.

**Development Time** :The most obvious minus point about building a responsive website is that it takes more time. A regular desktop site takes less preparation time, less resources to build it, and also testing it requires less effort. It usually takes longer to convert an existing website into a responsive one than to build one from scratch Limited support of media queries. Responsive websites work with media queries to determine the screen size of every visitor and then display the correct layout. The problem here is that old browsers, don't recognize media queries.

**Scalable images lose details** :Another limitation of RWD is the scaling of images. Scaled images quickly lose details and thus their meaning. Basically, scaling happens strictly based on screen size and not on context. An alternative to scaling images might be to crop them. Still their meaning and the experience that comes with it will ultimately be altered.

**Navigation menus** :Navigation menus make up for an important part of any website. Especially on more complex desktop websites we are used to multi-layer drop-down menus while smaller devices always encounter limited screen real estate, which makes designing intuitive navigation menus a challenge.

**Different devices offer different interactions** :Desktop version not only differs from the mobile version in a hypothetical, but also in a very practical way. Interaction that works just fine on one device may be irrelevant on another and this is because the way we interact with desktop and mobile devices differ. While we use keyboard shortcuts and a very defined mouse pointer to navigate through a website on one device, we have nothing more than our fingers on the other.

**Loading time**: Due to unnecessary HTML/CSS code downloads in a mobile device, loading time is usually higher. It is one of the major drawbacks of responsive web design.

## V. CONCLUSION

Responsive Web Design is an emerging trend that involves designing websites and applications for optimal viewing across multiple devices and screen sizes using a single code base. The advantages of Responsive Web Design include a single code base that provides easy and low maintenance along with a single version of the website that improves SEO. The design of your website and mobile service should be based on your target audience. Building a site using either approach requires thorough planning and a good understanding of the user's roadmap through the site on every type of device. Therefore, if you want a solution that's easy to maintain, makes use of existing skills and that you can control, then Responsive Web Design is the approach for e-commerce Website. The another reason is that mobile phones and tablets are just the beginning. There's no telling what other devices people will be using to browse the web in the future. We are already seeing people use their television to browse the Internet. Several years down the line, people may start browsing the Internet on car display panels, digital alarm machines, 3D screens, etc. Setting up a responsive website will help e-Commerce companies future-proof against new technology, digital trends and changes in browsing habits.

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