**Are there distinct customer segments in the customer population?**

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There are distinct customer segments within the customer population and ways to target each one.

**Key Takeaways**

* There are distinct weekday and weekend customer segments.
* Items that are often purchased together present an opportunity to increase sales of those items.

**Analysis Summary**

To answer if distinct customer segments exist within the customer population; I considered data for 1000 transactions. The variables include 50 different products sold and whether the transaction occurred on a weekend or weekday.

I conducted 5 kmeans analyses for 4, 5, 6, 7 and 8 segments to find the strongest pattern in the observations. I determined that the 7 segments model accounts for the most variance. This means that with 7 customer segments we can correctly group more observations than with 4, 5, 6 or 8 customer segments.

However, 68% of the transactions were grouped according to weekend or weekday purchase with no other really strong. Because of this, I have chosen to look at weekday and weekend transactions separately.

It is important to note that there are two strong segments that appeared here but do not after we divide the data. The Lemon Heads is a segment of 76 transactions with 76% and 75% include a purchase of a Lemon Tart and a Lemon Cake respectively. Also there was a breakfast group of 77 transactions with 88% and 61% purchases of Orange Juice and Cheese Croissant respectively.

**Weekday Transactions**

Of the 1000 observations, 685 occurred on a weekday. Again I conducted 5 kmeans analyses and 8 customer segments proved to account for the most variance. The 8 weekday customer segments are described below:

* **Cake Lovers** – 250 of the 348 observations in this group bought at least one cake.
* **Cookie and Cake** – 73% and 71% of these observations purchased a Gangolais cookie and Truffle cake respectively. At least 43 of the 99 observation had both a Gangolais cookie and Truffle cake.
* **Cookies** - 80% and 68% of these observations purchased a Tuile cookie and Marzipan cookie respectively. At least 42 of the 87 observation had both a Tuile cookie and Marzipan cookie.
* **Espresso and a treat** - 86%, 53% and 53% of these observations purchased a Single espresso, Coffee eclair and Blackberry tart respectively.

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| **Cake Lovers Obs=348** | **Cookie and Cake Obs=99** | **Cookies Obs=87** | **Espresso  and a treat Obs=43** |
| Strawberry Cake (.14) | Gongolais Cookie (.73) | Tuile Cookie (.80) | Single Espresso (.86) |
| Chocolate Cake (.13) | Truffle Cake (.71) | Marzipan Cookie (.68) | Coffee Éclair (.53) |
| Chocolate Coffee (.13) |  |  | Blackberry Tart (.53) |
| Lemon Cake (.12) |  |  |  |
| Napoleon Cake (.12) |  |  |  |
| Lemon Tart (.12) |  |  |  |
| Bottled.Water (.12) |  |  |  |
| Cherry Tart (.11) |  |  |  |
| Casino Cake (.11) |  |  |  |
| Berry Tart (.11) |  |  |  |
| Opera Cake (.10) |  |  |  |

* **Apple lovers** – 97%, 88%, 85% and 82% of these observations purchased an Apple Tart, Apple Croissant, Cherry Soda and Apple Danish respectively. These items were purchased together most of the time.
* **Treats with coffee** – All of these observations purchased a Blueberry Tart and an Apricot Croissant. 81% also purchased a hot coffee.
* **Apple pie and more** - 91% of these observations purchased an Apple Pie and Coffee Éclair. 83%, and 65% of these observations purchased an Almond Twist, and Hot Coffee respectively.
* **Cookies and Lemonade** - All of these observations purchased a Raspberry Cookie, Raspberry Lemonade and Lemon Cookie. 95% and 67% of these observations also purchased a Lemon Lemonade and Green Tea respectively.

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| **Apple lovers Obs=33** | **Treats with coffee Obs=31** | **Apple pie and more Obs=23** | **Cookies and  Lemonade Obs=21** |
| Apple Tart (.97) | Blueberry Tart (1) | Apple Pie (.91) | Raspberry Cookie (1) |
| Apple Croissant (.88) | Apricot Croissant (1) | Coffee Éclair (.91) | Raspberry Lemonade (1) |
| Cherry Soda (.85) | Hot Coffee (.81) | Almond Twist (.83) | Lemon Cookie (1) |
| Apple Danish (.82) |  | Hot Coffee (.65) | Lemon Lemonade (.95) |
|  |  |  | Green Tea (.67) |

**Weekend Transactions**

Of the 1000 observations, 315 occurred on a weekend. Again I conducted 5 kmeans analyses and 7 customer segments proved to account for the most variance. The 7 weekend segments are described below:

* **Cake Lovers** – 84 of the 162 observations in this group bought at least one cake.
* **Treats with a hot drink** – The percentages listed below show the treats that are often bought with a hot coffee or single espresso.
* **Apple lovers** - 96%, 54%, 54%, and 36% of these observations purchased an Apple Danish, Apple Tart, Apple Croissant and Cherry Soda respectively. These items are often purchased together.
* **Chocolate Cake Lovers** - All of these observations purchased a Chocolate Cake. 64% and 52% also bought Chocolate Coffee and Casino Cake respectively.

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| **Cake Lovers Obs=162** | **Treats with  a hot drink Obs=38** | **Apple lovers Obs=28** | **Chocolate Cake Lovers Obs=25** |
| Napoleon Cake (.15) | Blackberry Tart (.61) | Apple Danish (.96) | Chocolate Cake (1) |
| Gongolais Cookie (.14) | Blueberry Tart (.45) | Apple Tart (.54) | Chocolate Coffee (.64) |
| Lemon Cake (.14) | Coffee Éclair (.24) | Apple Croissant (.54) | Casino Cake (.52) |
| Berry Tart (.14) | Apricot Croissant (.24) | Cherry Soda (.36) |  |
| Truffle Cake (.12) | Hot Coffee (.24) |  |  |
| Lemon Tart (.12) | Single Espresso (.24) |  |  |
| Tuile Cookie (.12) |  |  |  |
| Strawberry Cake (.11) |  |  |  |

* **Vanilla Frappuccino with a Treat** – All of these observations purchased a Vanilla Frappuccino. 52%, and 44% also purchased a Chocolate Tart and Walnut Cookie respectively.
* **Fruit and Cake** - All of these observations purchased a Cherry Tart and an Apricot Danish. 84% also purchased an Opera Cake.
* **Apple pie and more** – 94%, 83%, 72% and 67% of these observations purchased Apple Pie, Coffee Éclair, Hot Coffee and Almond Twist respectively. These items are often purchased together.

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| **Vanilla Frappuccino  with a Treat Obs=25** | **Fruit and Cake Obs=19** | **Apple pie and more Obs=18** |
| Vanilla Frappuccino (1) | Cherry Tart (1) | Apple Pie (.94) |
| Chocolate Tart (.52) | Apricot Danish (1) | Coffee Éclair (.83) |
| Walnut Cookie (.44) | Opera Cake (.84) | Hot Coffee (.72) |
|  |  | Almond Twist (.67) |

Given this information there are several things Cookie & Icing can do to increase sales of certain items. There are three segments of customers that appeared in both weekday and weekend transactions. Apple lovers, Apple pie and more and Cake lovers.

The apple lovers tend to purchase more than one apple product at a time. Because this is so common, it is easy to assume that people who buy only one apple item do not need much encouragement to buy a second one. So Cookie and Icing could offer a discount on a second apple product or a cherry soda.

There is a high overlap of purchases of apple pies, coffee éclairs, almond twists and hot coffee. Offering a free coffee with the purchase of one of these items, or a discount on a second item may increase sales of these items.

Cakes are purchased in high quantity both on the weekdays and weekends. To target the cake lovers, Cookie & Icing could offer a discount on a second cake, or a punch card program with a discounted cake after so many cake purchases.

The chocolate cake lovers is a customer segment that appears only on the weekends. Cookie & Icing could offer a weekend special for those that buy a chocolate cake and casino cake receive a free chocolate coffee.

**Commentary**

I believe that the kmeans method provided a strong analysis of the transactions. I would recommend using your business expertise to evaluate which of the above recommendations would work best for your business.